WELDING ENGINEER

SEPTEMBER, 1951 35¢

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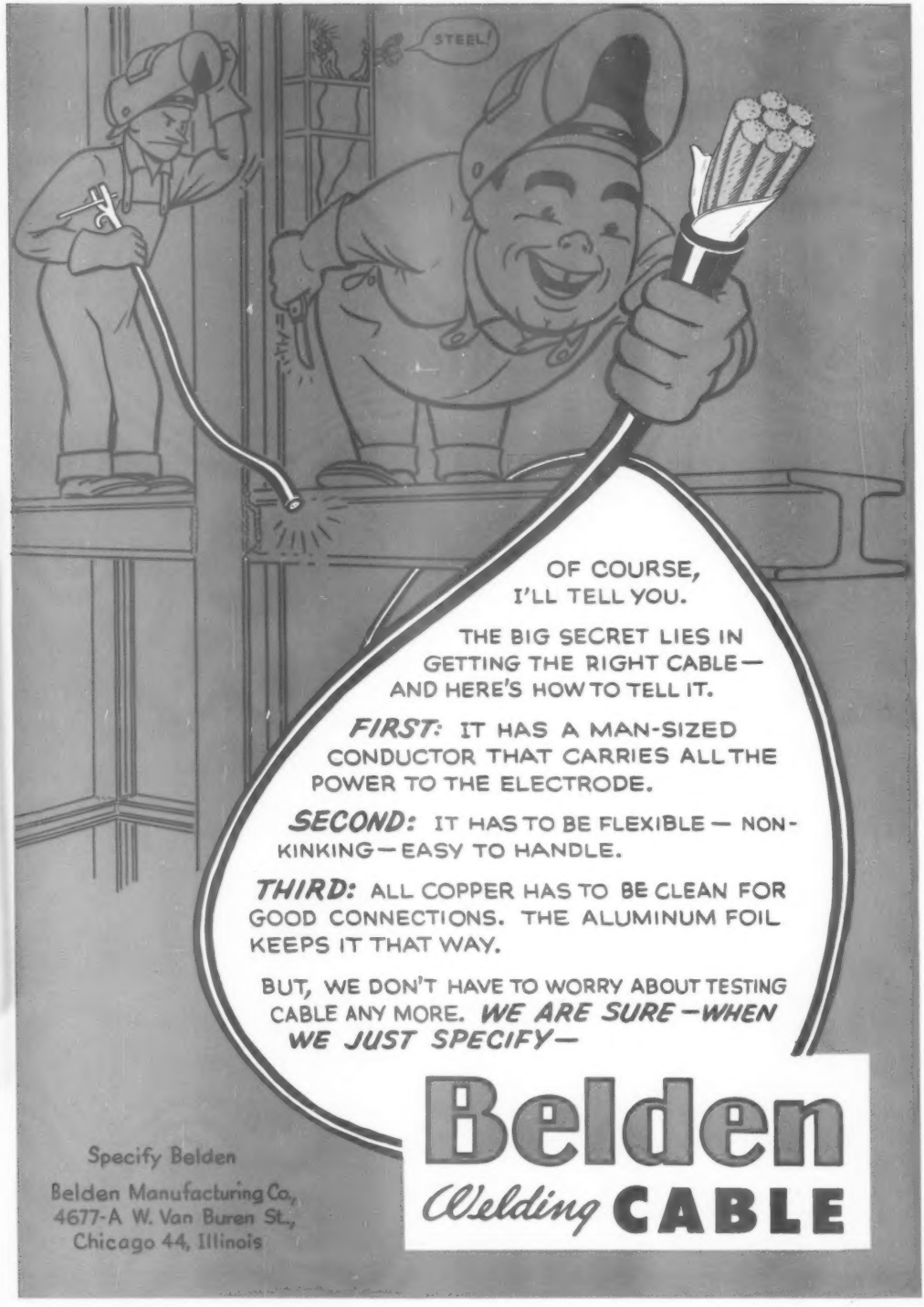
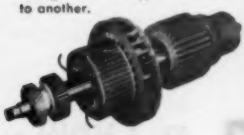
A METHUEN PUBLICATION


STEEL!
OF COURSE, I'LL TELL YOU.
THE BIG SECRET LIES IN GETTING THE RIGHT CABLE— AND HERE'S HOW TO TELL IT.
FIRST: IT HAS A MAN-SIZED CONDUCTOR THAT CARRIES ALL THE POWER TO THE ELECTRODE.
SECOND: IT HAS TO BE FLEXIBLE — NON-KINKING — EASY TO HANDLE.
THIRD: ALL COPPER HAS TO BE CLEAN FOR GOOD CONNECTIONS. THE ALUMINUM FOIL KEEPS IT THAT WAY.
BUT, WE DON'T HAVE TO WORRY ABOUT TESTING CABLE ANY MORE. WE ARE SURE — WHEN WE JUST SPECIFY—
Belden
Welding CABLE
Specify Belden
Belden Manufacturing Co.,
4677-A W. Van Buren St.,
Chicago 44, Illinois

REMOTE CONTROL lets operator make correct heat adjustments right at his work—no returning to machine—no lost time.

POLARITY CONTROL switch is instant, positive—makes it easy to change from one type of electrode to another.



COOL RUNNING because air passes through, as well as around, the armature parts. End-to-center ventilation changes air twice as often.

CUTS COSTS for you...

in the plant...in the field...on the road...*anywhere!*

Stationary Gas Drive Welder can be hauled...

...or Portable can be towed right to the job.

It stands to reason that if you put more into a welder . . . you'll get more out of it.

Hobart has done just this. They've put in "more" in the way of engineering, material, and convenience features . . . so you can take out "more" in performance, the real key to lower costs. That's why, dollar-for dollar, you just can't beat a Hobart Welder.

Every Hobart has plenty of extra reserve capacity, dependability, and long life. Wherever you take them and however you treat them, they've got what it takes to stand the gaff and still give top performance.

Hobart's exclusive Multi-Range Dual Control gives you a selection of 1,000 volt-amp combinations. Remote Control, at no extra cost, lets you make heat adjustments right at your work—no returning to the machine.

If you really want to cut your costs, investigate Hobart Welders. Just check the coupon for full information.

HOBART BROTHERS CO., BOX U-91, TROY, OHIO

"One of the world's largest builders of arc welders

The HOBART 300 amp. electric drive welder

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FIRM _____

ADDRESS _____ ☐ home ☐ business

CITY _____ STATE _____

glare doesn't pay...it COSTS!

"glare" *costs because it hides work details, and causes eyestrain and fatigue, all of which lower welder confidence, efficiency and production.*

CESCO ***Re-Flecto-Ray*** **Lens**

***But* NOW *you can cut* glare *and your welding costs, too ...with* CESCO's New *Re-Flecto-Ray* lenses**

CESCO ***Re-Flecto-Ray*** **Lenses** have a mirror-like surface which kills glare by deflecting direct light rays. A *Re-Flecto-Ray* Lens, placed between regular filter and cover lenses, permits welders to see their work in sharp detail. This increases quality and production—cuts down eyestrain and fatigue.

- While *Re-Flecto-Ray* Lenses cost a mere 15¢ each, (slightly higher in Canada) their glare-reducing qualities are equal to those of much more costly lenses.
- For lower welding costs and a simplified inventory stock CESCO conventional filter lenses and *Re-Flecto-Ray* Lenses. Your welders will like them—let them try them and see.

for Information about CESCO's complete line of Welding Helmets and Goggles see your CESCO distributor or write...

***for durable leakproof welding helmets specify* CESCO**

No. 401-2 Lift Front Welding Helmet. A favorite all-purpose helmet featuring streamlined lift-front lens holder with shock-absorbing action. One-piece seamless shell is drawn from hard, vulcanized fibre. Adjustable chin rest and formfitting adjustable headgear with leather sweatband.

Cesco's **No. 401-6 Welding Helmet** meets safety and comfort requirements for most production and maintenance welding. Seamless vulcanized fibre shell is equipped with leak-proof telescoping lens holder. Has adjustable chinrest and formfitting headgear that can be locked to desired size.

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SEPTEMBER, 1951

COVER: *Hull of 600-ft ore carrier of Inland Steel Co. has been flame-cut in two, preparatory to receiving a new 72-ft midsection.* *See page 33.*

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electrodes through ⅜", 500 amps.
Price $7.50, lower in quantity

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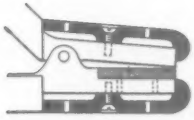
with larger handle for greater ventilation
Price $8.00, lower in quantity



Something new has been added to these three Jackson Electrode Holders.

Not only are their tongs made of a heat treated superior 98% copper alloy—Not only has it been proven in tests that these Jacksons have extra *tensile strength*, extra *hardness*, and extra *conductivity* over other makes of copper alloy holders—*but* . . .

The latest "EXTRA" is in the lower jaws that are now made *replaceable*, without having to replace the entire lower tong.

For no matter how strong we make them, it's the lower jaws that have the grooves to grip the rods, and tend to wear out faster than the rest of the holder.

It's these *replaceable jaws* that will make these Jackson Double-A models your preference for long, economical performance.

Call your Jackson distributor for prompt delivery of these and many other Jackson Electrode Holders, Ground Clamps and Cable Fittings, Eyeshields, Safety Goggles.

Standard Models Continued

Long-time favorites, Jackson insulated copper alloy holders with one-piece tongs, will, of course, be continued. They are of the same capacity as the double-A holders of like numbers, above.

Cables may be soldered, brazed, or clamped in place mechanically.

Model A-1	Model A-3	Model A-3S
$5.50	$7.00	$7.50

All prices lower in quantity.

JACKSON
PRODUCTS
WARREN • MICHIGAN

WORLD'S LARGEST MANUFACTURER OF ELECTRODE HOLDERS

NEWS FROM WASHINGTON

Browning Joins NPA Welding Eqpt. Section

WILLIAM B. BROWNING has joined the staff of the Welding Equipment Section, Metalworking Branch, NPA, as a specialist on gas welding and cutting apparatus and welding rod, it is announced by section chief Dale Spoor.

Mr. Browning is a veteran of over 25 years in the welding industry. For eight years prior to his appointment to NPA, he was manager of press service, southern region, for Linde Air Products Co. in Birmingham, Alabama. Previous to that he was with Linde and the Oxweld Technical Service Co. in Chicago, Illinois.

He has taken an active part in the American Welding Society and the International Acetylene Association, both locally and nationally, and his long and varied experience will undoubtedly be of great value to the Welding Equipment Section and to the gas welding industry.

W. B. Browning comes directly from Linde to handle gas welding and cutting problems in the Welding Equipment Section of NPA

Price Boosts Still Need Individual Okays

WHEN OPS on August 9 indefinitely postponed the compulsory effective date of the manufacturing ceiling price regulations, it may have indicated that new regulations were on their way. However, until they arrive, price ceilings will still be based on the formulas set up in the present regulations. According to OPS sources, some manufacturers have been trying to jump the gun on the price boosts that the new controls law allows them under the Capehart amendment. This amendment allows them to add to their preKorean prices the overhead as well as other cost increases from the start of the Korean war up to July 26, 1951.

The present price orders use an earlier cut-off date and do not allow for overhead changes in computing price ceilings. However, the price agency has warned, the formulas in the original orders remain in effect and any price increases under the Capehart amendment must be gotten from OPS. In any event, OPS is expected to authorize increases for all manufacturers by industries even though it is not required to do so. The Capehart amendment says only that increases are to be considered individually on a case-by-case basis. But the paper work involved would be so tremendous that it would effectively hogtie OPS. So . . . new regulations may already be in the works.

1st Month Limit 40% Quarterly MRO Quota

IN ORDER TO keep the flow of MRO orders on mills for supplies of steel, copper and aluminum and other materials at a steady pace, NPA has ruled that manufacturers cannot receive more than 40% of their quarterly quotas of maintenance, repair and operating supplies in the first month of any quarter.

Unfilled Orders Not in Quarter Quota

IF YOU placed an order for controlled materials to be delivered in the second quarter and it wasn't delivered in time, the undelivered amount will not be held against your third-quarter allotment.

This is the gist of Direction 5 to CMP Regulation 1, issued to allay the apprehension of purchasers who, through no fault of their own, were unable to receive full delivery of their orders during the second quarter. However, those who placed orders in the second quarter for delivery during the third must deduct the amount of such orders from their third-quarter allotments, regardless of whether they were obtained by an authorized CMP order, a rated order, or an unrated order.

Schedules on CMP Orders Clarified

A CLARIFICATION of CMP Regulation 1 makes it unmistakably clear —a mill is not permitted to accept an authorized controlled material order if it cannot be filled during the calendar quarter for which it is valid, unless it is revalidated for a subsequent quarter.

Under Regulation 1 a producer who cannot accept an order for delivery in the month specified must accept if he can fill the order during the next two months and must fill the order as soon as possible, if this satisfies the customer. If it means delaying the order from one quarter to the next, however, as Amendment 2 points out, the producer may accept the order only if the customer certifies that he holds an allotment valid for the later quarter. In such cases, the customer must charge the delivery to his allotment for the quarter in which the order is scheduled to be received.

NPA Orders 100% CMP Effective October 1

DPA ADMINISTRATOR Manly Fleischmann announced formally on August 7th that the nation's entire economy will be placed under the Controlled Materials Plan in the fourth quarter starting October 1. This means that all users of steel,

NEWS FROM WASHINGTON *(Continued from page 5)*

copper and aluminum must get their supplies from now on under CMP allotments and must not use more of these controlled materials than they are allotted.

Troubles encountered in operating under the open-end plan made this change necessary. For example, some manufacturers ordered in duplicate, while others failed to cancel or adjust their outstanding orders. However, the "free area" will continue to a limited degree for another 60 to 90 days in order to provide a smooth transition to CMP.

Defense Loans for Small Business Also

SMALL BUSINESSES engaged in the national defense effort can obtain financial help from the government. But the question of who is eligible for loans from the government is much misunderstood.

A four-page pamphlet, "Defense Loans for Small Business," has been issued by the Office of Small Business of the National Production Authority to explain the details in easy-to-understand terms. Copies of the pamphlet are available for 5c each from Printing Services, Department of Commerce, Washington 25, D. C., or from any Department of Commerce field office.

More Cadmium for Silver-Brazing Alloys

WITH INVENTORIES of cadmium backing up in the hands of producers pending the placement of a larger volume of defense orders, NPA Regulation M-19 restricting the use of the metal was amended to permit an increased use.

The original cadmium conservation order restricted the use of cadmium almost exclusively to the production of war implements or essential civilian products in which there is no satisfactory cadmium substitute. One of cadmium's chief uses is in silver-brazing alloys and in other alloys where great strength is essential. Under the amendment, the permitted use of cadmium in silver-brazing alloys was increased from 19% to 25% by weight.

Another feature of the amended regulation is in the 30-day inventory restriction. Henceforth, accumulations exceeding this amount will be permitted when this is necessary because of minimum purchasable quantities.

New Machine Tool Assistance Policy

IN AN EFFORT to break the bottleneck in metalworking machinery, NPA has offered special help to machine-tool builders who need, but are unable to obtain, metalworking equipment for their own use. If necessary, such equipment will be diverted from intended customers to the machine-tool manufacturer who needs it for the expansion of his facilities. Thus, machine-tool builders will have first call on the output of their own industry, instead of taking their turns on DO rated orders.

Last month GSA offered to help finance machine-tool builders by advance payments up to 30% of the value of their government orders if they were unable to secure private financing at reasonable terms.

CMP Violations To Be Prosecuted

WILFUL violation of NPA orders is a serious offense. This was highlighted recently when criminal proceedings were instituted against a fluorescent light manufacturer in a New York Federal court. The Ender Mfg. Co. and its president are charged with overextending a DO-40 (Atomic Energy Commission) order for cold-rolled steel by some 125,000 pounds and with selling this surplus at 15c and 17c a pound at a time when the market value was 7c a pound. If convicted, the president faces a fine of not more than $10,000 and up to one year in prison, on each of the 12 counts charged.

This case is the first of a nationwide series of prosecutions of wilful violators, NPA Administrator Manly Fleischmann declared. Many violations have already been disclosed, and 10 cases besides that of the Ender Mfg. Co. are being prepared for criminal prosecution. The following steps have been taken to minimize violations:

A "Compliance Court" of eminent jurists has been set up to hear and act on charges of violations of NPA orders and regulations.

A "Compliance Investigation" has been started by trained investigators to cover about 1,000 representative companies.

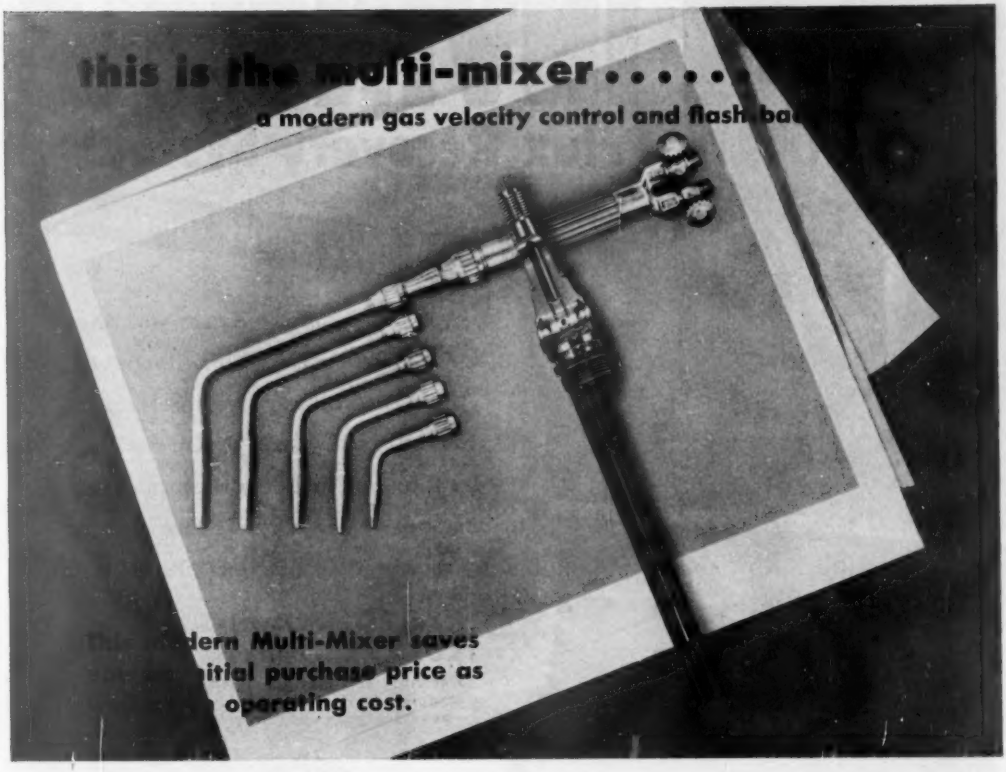
"Flying Squads" of enforcement specialists will gather evidence from manufacturers records, for immediate and vigorous prosecution where a manufacturer wilfully violates CMP regulations.

Structurals Stop Tax Write-offs for 60 Days

FAST TAX write-offs awarded to industry for new or expanded defense facilities were reported as totaling 8.9 billion dollars up to August 10. Due to the limited availability of critical materials, especially structural steel, Defense Mobilizer Wilson ordered a 60-day halt on the granting of fast amortization privileges during that time except for expansion of raw materials production or to finish up vital projects under construction.

The extremely short supply of structural steel has given rise to criticism of the rapid tax write-off program on the ground that some of the projects authorized are not particularly essential to the defense effort and just make the shortage more critical.

Welding, as we well know, can be instrumental in saving steel on the job. During the last war, the same shortage was felt. In the interest of conservation of critical materials, one of the recommendations of the War Production Board was to utilize welding as the means of fabrication wherever possible. We believe that the present committee on conservation has similar ideas under consideration and may present them before long.


this is the multi-mixer . . . . . .
a modern gas velocity control and flash-ba
dern Multi-Mixer saves
itial purchase price as
operating cost.

Here is a welding torch so thoughtfully designed and so carefully manufactured that it actually gives to you greater value—lower maintenance cost, and finer operation with maximum safety.

And, here is how it does it. By better gas velocity control the National Multi-Mixer solves three important problems: 1. It permits the oxygen to join the fuel gas without causing centrifugal separation of the gas molecules; 2. It does so without creating undesirable eddies in the stream of the mixing gases; and, 3. It limits the possibility of "flash-back" by breaking up the stream of the fuel gas into numerous small passages.

The National welding torch has a single gas mixer fully able to supply the entire range of tip sizes with an adequate, perfectly mixed, flow of gases.

Like an excellent carburetor of a modern automobile, the National Multi-Mixer is fully able to meet all of the needs of an efficient welding or flame cutting torch.

It is wasteful and unnecessary to encumber your pocketbook or your torch with prima-donna mixer-nozzles, each one with but limited usefulness.

"YOU DON'T NEED AN EGG BEATER TO MIX GASES . . ."

Write for this very interesting booklet today — it's free.

B11

Made by National SINCE 1910 **WELDING EQUIPMENT CO.,** San Francisco 5, California

INVINCIBLE
Flux Recovery Systems

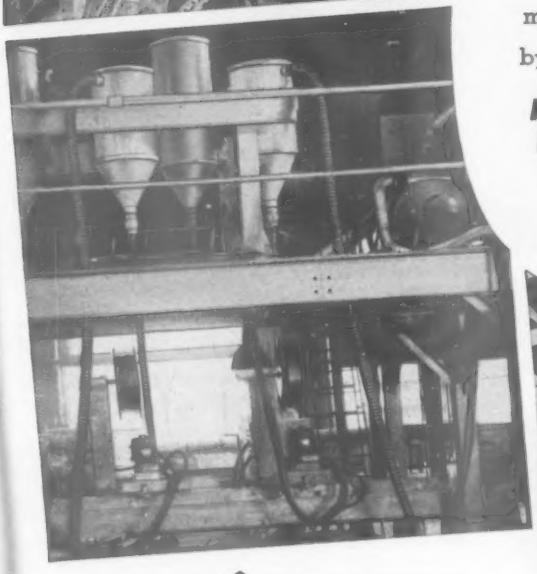
This installation *automatically* salvages useable flux and returns it to hopper of welding head. Circular magnets are being welded.

Quickly Repay Their Costs

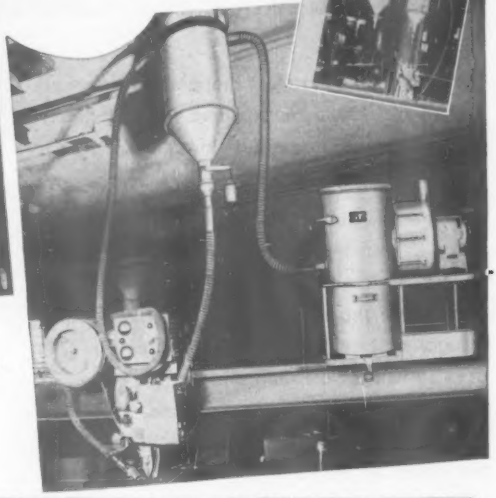
• On submerged arc welding jobs, Invincible Flux Recovery Units save money by: **1** Salvaging *all* unfused flux, **2** Operating far more efficiently than manual methods, **3** Reducing welding rejects by removing all fine dust (flux flour).

FREE FOLDER on FLUX RECOVERY

Describes and illustrates the complete Invincible line . . . *send for your copy Now!*



Flux is being recovered simultaneously from *2* welding heads on this installation. Water tanks are being welded.



Welding locomotive parts. *Only* primary separator tank is elevated, thus eliminating need for another supporting jig.

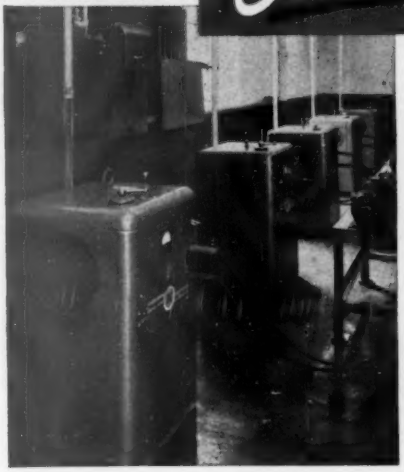
INVINCIBLE VACUUM CLEANER MFG. CO.

DOVER, OHIO

FOR 40 YEARS, LEADERS IN INDUSTRIAL VACUUM EQUIPMENT

WESTINGHOUSE RECTIFIER WELDER

Solves CRITICAL THIN-GAUGE PROBLEMS



The exceptionally thin metals welded by Badger demand an absolutely steady arc at low current settings. Five Westinghouse Rectifier Welders with extended current ranges allow a 10-ampere minimum setting.

for The Badger Fire Extinguisher Company

Expansion Joint Division

"The Westinghouse D-C Rectifier Welder is the only welder which can handle our critical welding jobs at every point," says Mr. Walter Benson, Engineer of the Badger Fire Extinguisher Company, Expansion Joint Division, Somerville, Mass.

Welding specifications are especially rigid at this plant. The stable arc that the Westinghouse Welders supply at low current settings is essential in welding the thin metals used. These welders make uniformly tight welds on critical diaphragms and expansion joints which range in gauge from .10 to .125 inches. They handle tricky edge welds on parts ranging in size from that of a dime to that of a dinner plate.

Because most stresses occur at the weld, a joint that is as strong as the metal itself is required. The Westinghouse Rectifier Welder produces this strength in all welds. On the edge welds, penetration at least 1½ times the thickness of the metal is achieved.

Operators like the quiet performance of the Rectifier Welder. Management likes the fact that the machines do not accumulate or scatter dirt—good thin-metal welding demands scrupulously clean working surfaces.

You may never have to weld wafer-thin metals but, whatever your application—large or small—the Westinghouse D-C Rectifier Welder will handle the job best. Call your nearest Westinghouse Distributor or write Westinghouse Electric Corporation, Dept. DC-66, Welding Division, 4457 Genesee Street, Buffalo, New York.

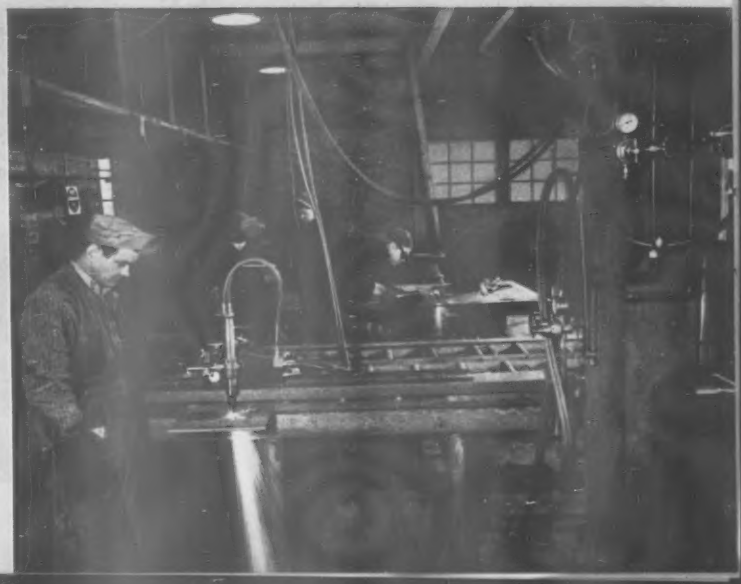
J-21610

YOU CAN BE SURE ... IF IT'S

Westinghouse

Rectifier Welders

Above: Efficient, low-cost cutting of scrap is assured at the Bronx Iron and Metals Corp., New York, with use of Torchweld 75 Hand Cutting Torches and an up-to-date pipeline gas supply system. Piped from a trailer-serviced oxygen storage bank and an acetylene manifold, gases are conveniently at hand all over the yard from well-type stations, like the one seen in the picture. The steel well-cover closes when the station is not in use to permit normal traffic and yard use of the ground area.

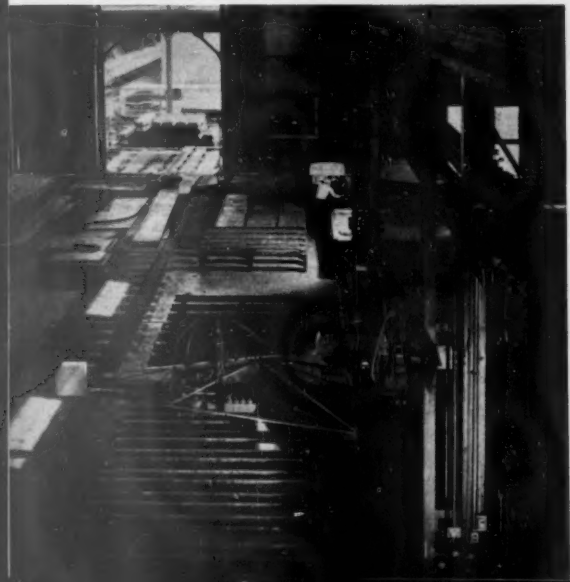


At right: "We have reduced our gas consumption by 33⅓% and substantially cut our labor costs since standardizing on Torchweld equipment and installing an NCG manifold system," says Harvey Wallert, shop foreman; and Gene De Buck, maintenance superintendent, of Knoebel Iron Works, Inc., Chicago fabricators specializing in building steel. "The Torchweld No. 36 cutting torches we use really stand up in hard use. For instance, we use templates for hole piercing ¼-inch stock, and that puts a torch to a tough test. We also use NCG automatic flame cutting equipment, and Sureweld electrodes for electric arc welding."

Short-cuts to Lower Costs

NCG know-how boosts efficiency, increases output and lowers costs in plants of every kind and size throughout the country

Components for barges, towboats, derrick boats and other types of vessels are speedily cut from plate in the shops of the Hillman Barge and Construction Co.'s plant at Alicia, Pa. These two NCG RS Cutting Machines work directly from patterns made in the Hillman pattern loft to cut required shapes. Hillman, designers as well as fabricators, have used NCG products exclusively for the past 10 years.



One of the big answers to today's problem of holding down production costs is the use of more efficient tools . . . tools that will get the job done better and with less working time. If you *weld metals* with the electric arc . . . if you *weld them, braze them, cut them* or *treat them* with the oxy-acetylene flame . . . you'll find that NCG has the tool that will do it with top efficiency. Whether it's on a torch, a welding machine, an electrode or a cutting machine, you'll find—as so many others have—that the NCG trademark means you'll get the job done faster, with less effort, and with better results. And, *especially important now*, you'll find that NCG equipment lasts longer and requires less maintenance.

Representatives at 51 NCG offices and authorized NCG dealers from coast to coast can show you why it pays you to buy NCG products. Call the one nearest you now, or write us.

NCG®

EVERYTHING FOR WELDING

RELY ON NCG

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Executive Offices:

840 N. Michigan Avenue, Chicago 11, Illinois

Copr. 1951, National Cylinder Gas Co.

NEW Aircomatic® Process jumps Welding Speeds to NEW HIGHS

SAVES 16 MAN-HOURS WELDING TIME . . . Dempster Brothers, Incorporated of Knoxville, Tenn., makers of the nationally-known "Dempster-Dumpster" found Aircomatic welding cut their aluminum container manufacturing costs.

The other method was slow — cumbersome, and ran the cost exceedingly high. With Aircomatic the same container was produced — at a welding cost reduction of approximately 16 man-hours.

Aircomatic is a new metal arc welding process that permits high-speed welding of aluminum, of aluminum bronze and of stainless steel — *in all positions*.

The process uses a bare wire electrode in coil form, continuously fed to the work within an inert gas shield. High current densities are used providing excellent penetration and high deposition rates, *permitting welding at speeds greater than ever before possible.*

Aircomatic welding has proved most economical . . . for its high deposition rate, in addition to permitting high travel speed, also makes possible fewer passes on heavy material, and faster, heavier deposits for overlay or build-up work. This means more weld per unit of arc time, whatever the job. Further, since the wire is bare and continuously fed through a shield of inert gas, electrode changes and slag removal interruptions are eliminated, thus permitting almost 100% arc time in using the high operating speeds.

Another important feature of Aircomatic welding is its minimization of distortion. This is due to its high speed operation (heat can be concentrated and moved rapidly along the work), plus the fact that a small amount of weld metal is all that's required in most joints.

The case studies on the opposite page show how this dramatic new welding process is helping others. While the facts and figures are startling, they could very easily be applied in your own shop . . . but find out for sure. Write . . . or phone your nearby Airco office. Ask for a copy of ADR 66: "Aircomatic Welding Process".

SAVES 4½ HOURS . . . Martin-Quaid Co., of Philadelphia, Pa., used the New Aircomatic Process to reduce the time and cost of welding huge stainless steel cylinders used in the manufacture of carpets. They found this revolutionary process cut materials cost 25% . . . and saved 4½ hours working time over the old method — and, at the same time, greatly increased the quality of the finished product.

REDUCES TIME ⅘'s . . . Consolidated Welding and Engineering Company, of Chicago, Ill., adopted the new Aircomatic process for welding aluminum separators. Immediately, major production and cost problems were solved: To weld one complete separator assembly took only 90 man hours — about 1/5 the time of other methods.

Further, Aircomatic's high current density and the attendant high welding speed confined the heating effects to the narrow weld-zone . . . completely eliminating distortion.

ELIMINATES LEAKS . . . Griffin & Company, of Louisville, Ky., found Aircomatic's high speed and the ability to make welds without interruption ideally suited to the fabrication of tanks for all-aluminum evaporative coolers. Production time and cost was cut to the minimum, and warpage and distortion were completely eliminated. Thus far, the company has made hundreds of these tanks without a single leak.

BOOSTS PRODUCTION 71% . . . The Stewart-Warner Corporation, South Wind Division, Indianapolis, Ind., join the upper and lower halves of its "Safe-Air Gas Home Heater" with the completely new, high-speed Aircomatic Process. This time-saving, cost-cutting process skyrocketed production 71% . . . and cut manufacturing costs in proportion.

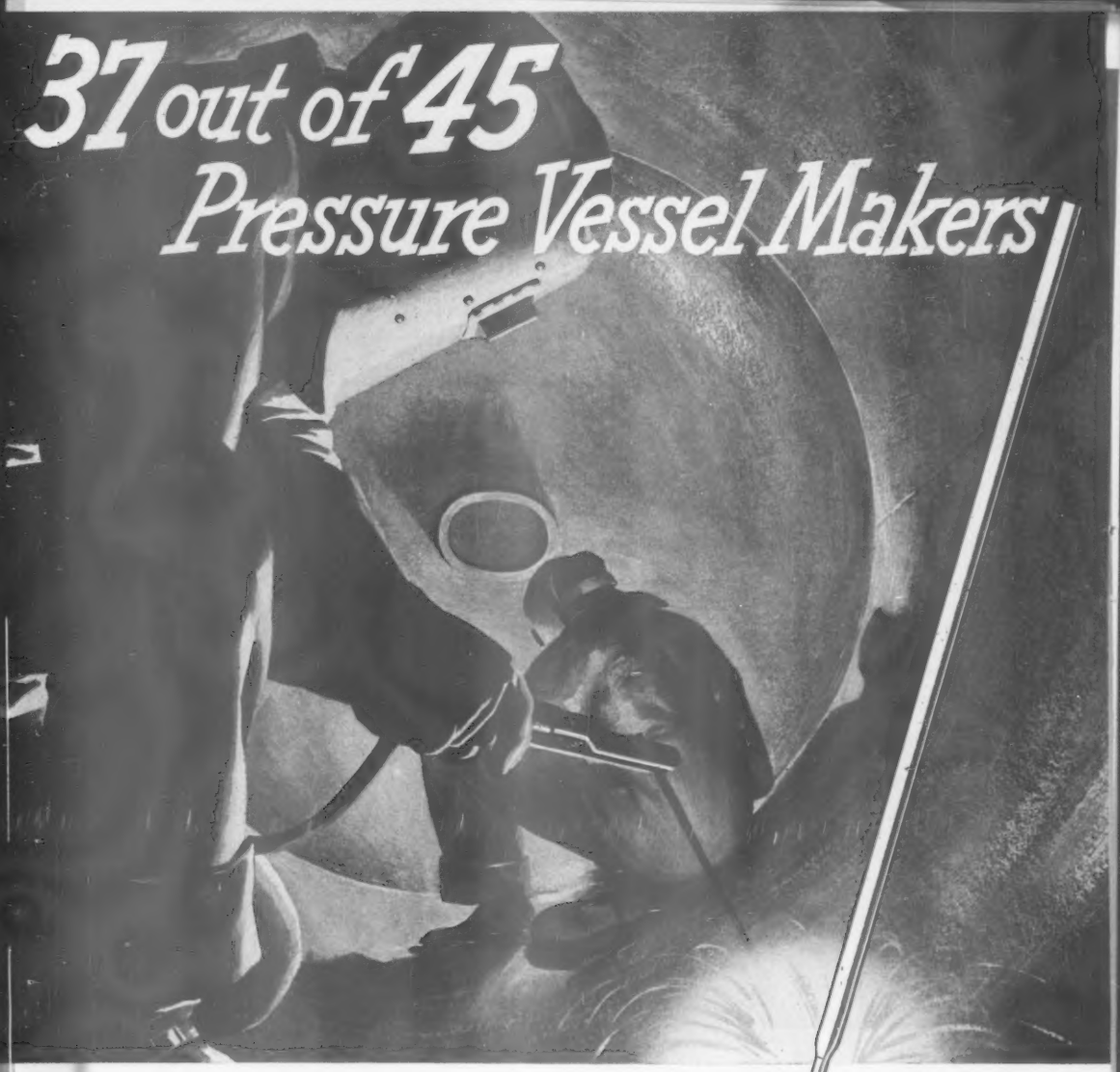
A new Aircomatic motion picture "The Tool For The Job" is available for specialized groups. Ask your nearest Airco office about showings.

AIRCO

AIR REDUCTION

AIR REDUCTION SALES COMPANY • AIR REDUCTION MAGNOLIA COMPANY
AIR REDUCTION PACIFIC COMPANY
REPRESENTED INTERNATIONALLY BY AIRCO COMPANY INTERNATIONAL
Divisions of Air Reduction Company, Incorporated
Offices in Principal Cities

37 out of 45 Pressure Vessel Makers



Thirty-seven out of the nation's forty-five foremost makers of pressure vessels are long-time users of Murex Electrodes.*

In this industry, welding electrodes must provide high quality weld metal to meet rigid code requirements — must have high deposition rates to assure economy of production. These are two characteristics for which Murex electrodes are noted.

WELD WITH...

MUREX®

*Those having AAAA directory financial ratings.

METAL & THERMIT CORPORATION

100 EAST 42nd ST., NEW YORK 17, N. Y.

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The highest quality safety lenses and welding lenses are available to you now at less cost. Exceeding all Federal specifications, they are the dependable products of one of America's oldest and most skilled lens makers.

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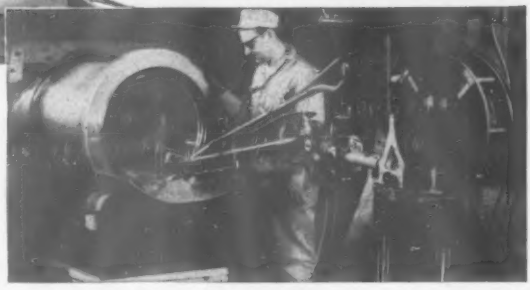
A Day's Output Every Hour

with UNIONMELT Welding

Trade-Mark

(*Above*) UNIONMELT welding a chromium alloy end ring to a mild steel pump shell takes only 1 hour and 23 minutes. Former methods of welding took 10 hours. Ring and shell, each 4 in. thick, are joined in consecutive passes as the work rotates under the UNIONMELT welding head.



(*Right*) This UNIONMELT welding machine smoothly deposits a sound, corrosion-resistant overlay inside a mild steel pump shell. Stainless steel metal — 20 to 120 lb. of it, depending on pump size — builds up at 20 lb. per hour. Highest former rate was 2 lb. per hour.

In making high-pressure steam pumps, these two welding operations used to take 20 hours—2½ working days. This was cut to 2½ hours by UNIONMELT welding as shown above. In addition, finishing costs dropped sharply because the UNIONMELT deposits are smoother and need less machining.

High-speed production is common wherever automatic UNIONMELT welding is used to join ferrous or non-ferrous metals. Welds up to 3 in. thick can be made in one pass; light-gage sheet can be welded at speeds up to 200 in. per minute.

UNIONMELT welding is only one of many time- and moneysaving LINDE methods for making, cutting, joining, treating, and forming metals. So, whatever you do with metals, there is a good chance that LINDE know-how, show-how, and equipment can help you do it better, more quickly, or at lower cost. Telephone or write to our nearest office today. LINDE AIR PRODUCTS COMPANY, a Division of Union Carbide and Carbon Corporation, 30 East 42nd Street, New York 17, N. Y. Offices in Other Principal Cities. In Canada: Dominion Oxygen Company, Limited, Toronto.

Unionmelt

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EQUIPMENT AND SUPPLIES
for fast, automatic electric welding.
No sparks, spatter, smoke, or flash.

The terms "Linde" and "Unionmelt" are registered trade-marks of Union Carbide and Carbon Corporation.

longer life for CRUSHERS!

Less down-time . . . less welding time . . . more production . . . more uniform aggregates—at lower cost! Coated AC-DC STOODITE gives you all that!

Compare total crusher maintenance cost, not just the first cost of the electrode you use. AC-DC STOODITE costs more than many rods, *BUT it's cheap in view of the tonnage produced.* Your welder will like the smooth arc, the speed and the ease with which he can lay STOODITE down.

Test AC-DC STOODITE . . . apply it on new crushers—or follow the wear pattern on worn rolls and cones. There are 600 Stoody dealers in the United States and Canada ready to serve you.

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WELDOLETS

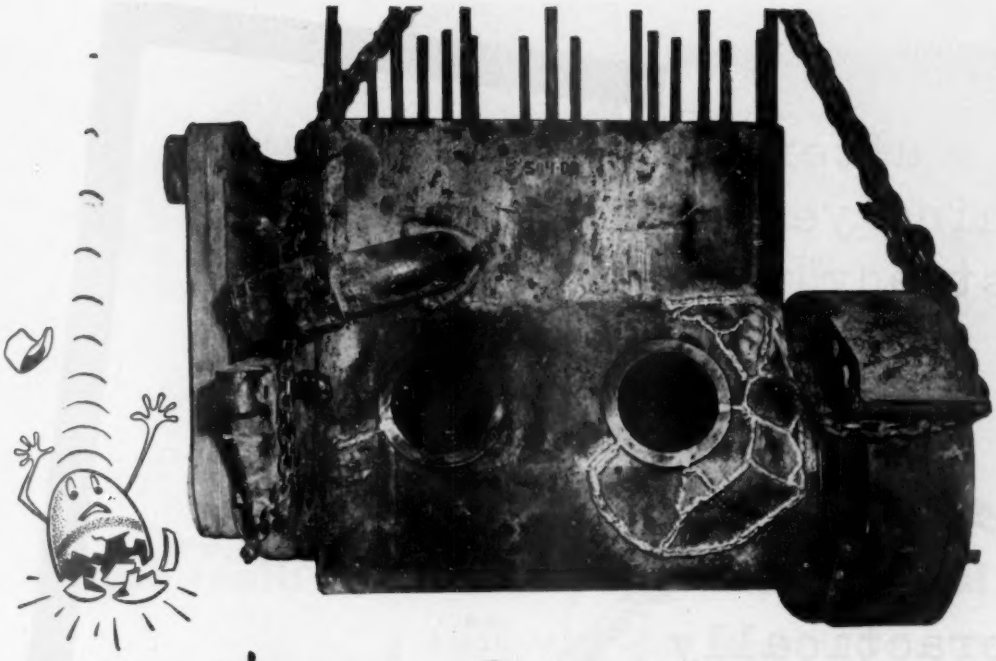
WELDING FITTINGS FOR ANY PIPING SERVICE

NATURAL GAS COMPRESSOR STATION PIPING CONSTRUCTED ECONOMICALLY AND EFFICIENTLY USING WELDOLET WELDING FITTINGS THROUGHOUT

This installation, together with a number of successful applications of WeldOlet Welding Fittings in various types of service is shown in the new Bonney W-3 WeldOlet Catalog.

The completely new Bonney catalog will furnish descriptive, dimensional information and installation instructions. The technical section demonstrates graphically how WeldOlet Welding Fittings offer the quickest, safest and most economical method of establishing and maintaining 100% pipe strength at branch connections in accordance with code requirements.

Write for your free copy to: BONNEY FORGE & TOOL WORKS



Unlike Humpty Dumpty,

this casting was put back together again ...with the help of Ni-Rod!

First a loose connecting rod — and *then* a shattered cast iron cylinder block!

It looked like the end for this casting. But, it *couldn't* be scrapped—it belonged to a tractor of obsolete model and could not be replaced.

What to do?

Put the pieces together and weld them.

Sounded like a good idea, but could it be done?

It *was* done — with Ni-Rod!

And here's how they did it...

The fractured parts were carefully fitted together and securely welded into the cast iron wall with 1/8" Ni-Rod electrodes.

Another irreplaceable casting was saved from the scrap pile and returned to service.

This is a typical example of what you can do with Ni-Rod.

It is so easy to use that even a novice welder with limited experience can quickly learn to lay high-strength, sound, nonporous, machinable welds. Preheating or post-heating are seldom required.

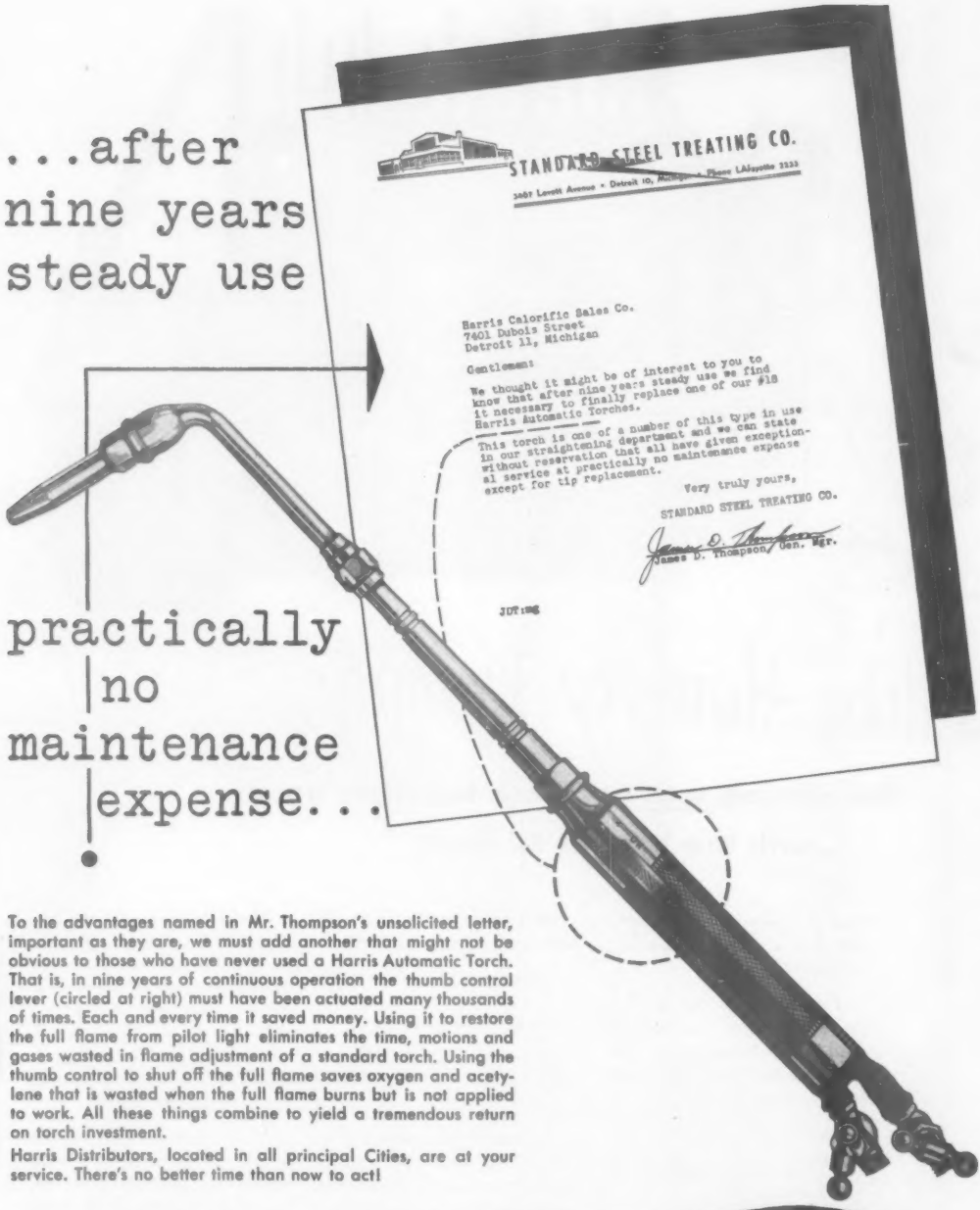
The salvaging of cast iron parts is becoming more and more important with increased defense production and you will discover that your job of saving these necessary parts is much easier when you use Ni-Rod. It comes in 3/32", 1/8", 5/32" and 3/16" diameters.

At times you may not be able to get all the Ni-Rod you want because so much is being diverted to defense needs. Your distributor will keep you posted on availabilities.

INCO NI-ROD TRADE MARK

The International Nickel Company, Inc.
67 Wall Street, New York 5, N. Y.

...after nine years steady use


STANDARD STEEL TREATING CO.
Harris Calorific Sales Co.
7401 Dubois Street
Detroit 11, Michigan
Gentlemen:
We thought it might be of interest to you to know that after nine years steady use we find it necessary to finally replace one of our #18 Harris Automatic Torches.
This torch is one of a number of this type in use in our straightening department and we can state without reservation that all have given exceptional service at practically no maintenance expense except for tip replacement.
Very truly yours,
STANDARD STEEL TREATING CO.
James D. Thompson, Gen. Mgr.
JDT:mg

practically no maintenance expense...

To the advantages named in Mr. Thompson's unsolicited letter, important as they are, we must add another that might not be obvious to those who have never used a Harris Automatic Torch. That is, in nine years of continuous operation the thumb control lever (circled at right) must have been actuated many thousands of times. Each and every time it saved money. Using it to restore the full flame from pilot light eliminates the time, motions and gases wasted in flame adjustment of a standard torch. Using the thumb control to shut off the full flame saves oxygen and acetylene that is wasted when the full flame burns but is not applied to work. All these things combine to yield a tremendous return on torch investment.

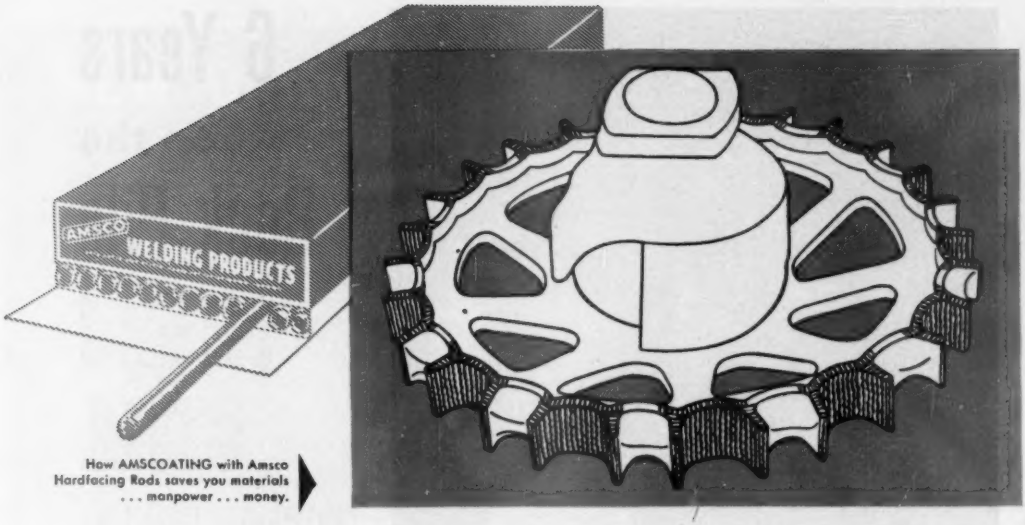
Harris Distributors, located in all principal Cities, are at your service. There's no better time than now to act!

THE HARRIS CALORIFIC COMPANY

Cleveland 2, Ohio

HARRIS

SERVING THE METAL INDUSTRY SINCE 1905



How AMSCOATING with Amsco Hardfacing Rods saves you materials . . . manpower . . . money.

These teeth take bites out of repair costs!

AMSCOATING . . . stands for control of wear by Hardfacing . . .

Hardfacing rods—and recommendations for their use—are as sound as the manufacturer who makes them. AMSCO has been fighting wear for a half-century—first with Manganese Steel, and later with AMSCO Hardfacing Products.

If you have a problem of wear caused by impact, abrasion, heat or corrosion . . .

Find out how AMSCOATING can save you materials . . . manpower . . . money!

AMSCOATING can make old Tractor Drive Sprockets last 3 times longer than new.

Here's another way to beat the high cost of replacements, down-time and maintenance . . . AMSCOATING the teeth on Tractor Drive Sprockets. Time after time service records have shown that AMSCOATING of sprockets results in these dollar-saving advantages:

1. ***On an average — 3 times the service life of a new, unhardfaced sprocket.***
2. ***2 out of 3 sprocket changes completely eliminated . . . far less down-time, less maintenance . . . more equipment out of the shop and on the job.***

To top it off, sprocket replacements can practically be eliminated. An AMSCOATED sprocket can be reclaimed over and over again . . . *at about half the cost of a new one!*

Get all the facts on how to make these big savings . . . write today for instruction sheet on AMSCOATING sprockets, and the name of your nearest AMSCO Distributor.

AMSCOATING
THE RIGHT WAY TO SAY HARDFACING

AMERICAN Brake Shoe COMPANY

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377 EAST 14th STREET • CHICAGO HEIGHTS, ILL.

Other Plants: New Castle, Del., Denver, Oakland, Cal., Los Angeles, St. Louis. In Canada: Joliette Steel Division, Joliette, Que.
Amsco Welding Products distributed in Canada by Canadian Liquid Air Co., Ltd.

6 Years on the Rock Pile ...and STILL SERVING TIME!

These hard-faced rock-crusher rolls have already outlasted unprotected rolls 12 times—and they are still in operation.

The hard-faced rolls on this rock-crusher mill have been in constant operation for six years. During this time, the rolls have been pulverizing such abrasive materials as ferro-alloys, ore, dolomite, feldspar, rock, sand, and clay used for making brick. Unprotected rolls, performing the same operations, had to be replaced every four or five months.

The serrated roll shown at the right in the photograph is the roughing roll used for initial grinding or milling. The smoother roll, at the left, is a finishing roll used to grind the abrasive materials into a powder. Both rolls were hard-faced with HAYNES STELLITE alloy by the metallic-arc process to protect them from abrasion.

The new 40-page booklet, "HAYNES Alloys—Hard-Facing Manual," gives the whole story on hard-facing. It includes information on what metals can be hard-faced, how to select the right HAYNES hard-facing material, step-by-step application procedures, and a list of typical industrial applications with recommended rods for each. If you would like a copy of this booklet, write to our nearest district office.

HAYNES TRADE-MARK *alloys*

"Haynes" and "Haynes Stellite" are trade-marks of Union Carbide and Carbon Corporation.

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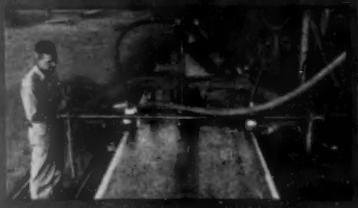
NEW ORIGINAL "VACU-BLASTER" CUTS WELDING COSTS



Thompson Pipe & Steel Co. formerly edge-cleaned steel sheets in a blast room some distance from the welding—cleaned plates often became rusty before reaching the welder. Consumption of abrasives was very high. They reported: "Installation of Vacu-Blaster has allowed us to blast the edges of plates just prior to welding, and this is done with no discomfort to welders or other workers nearby. Steel grit consumption has been reduced considerably."

Revolutionary Vacu-Blaster is the only blast-cleaner with a vacuum pick-up. It reclaims and reuses abrasive, eliminates flying dust and dirt, does away with clean-up time, actually pays for itself!

Vacu-Blaster can be precisely controlled to clean narrow strip on top and bottom edges of steel plate or to clean whole surfaces of metal, concrete, wood or brick. It's portable—can be moved to any job—or installed right in your production line. Ideal for pipe, tank, drum or pail manufacturing. (One company reports savings of $1000 a month after installing Vacu-Blaster!)

Hundreds of satisfied users. Mail coupon for details about patented Vacu-Blaster, the only blast-cleaner with a vacuum pick-up.

DEMONSTRATION CAN BE ARRANGED!

VACU-BLAST CO., Inc.

Write for FREE BOOKLET!

Vacu-Blast Co., Inc., 604 Peninsular Ave., San Mateo, Calif.
We would like your free Vacu-Blaster catalogue____ Wish to arrange for demonstration____ Our problem is_____

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Company_____

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A.O.Smith D-C WELDER

A NEW HEAVY-DUTY WELDER FOR ALL D-C APPLICATIONS

★ Field-Proven SUPERIORITY ★ Typical SMITHway Heavy-duty Precision Construction ★ Reduces D-C Welding Costs

Here is A. O. Smith's answer to your D-C welding requirements, a welder that's more efficient than motor-generator sets of like amperage . . . and much less expensive to buy and maintain.

A. O. Smith has retained in the D-C welder all the winning features that have made the A. O. Smith Hevi-Duty A-C Welders the heavyweight champs of all welders.

These superior features are your assurance of maximum duty-cycle percentage and minimum maintenance—of long-lived performance, unmatched by any other D-C welder:

NEW!
1. High velocity, directed downdraft ventilation and cooling prevents possibility of rectifier stacks overheating, assures proper cooling and internal cleanliness, whether used in shop or out.

NEW!
2. Case-diameter fan and "wind-tunnel" design makes sure of adequate, efficient air flow over all energized parts.

NEW!
3. Ball-bearing jacks—effortless to manipulate—raise and lower primary coils.

NEW!
4. Precision layer-wound coils assure full NEMA-rated capacity plus cooler, long-term operation.

NEW!
5. Simplified design assures maximum dependability, ease of connecting and operating.

NEW!
6. Weather-proof Case at no extra cost permits outdoor or in-shop operation.

Put this new A. O. Smith D-C welder on the job wherever direct-current output is required—and save money all down the line. No other D-C welder can match it!

The new A. O. Smith Rectifier-type D-C Welder. Available in 200, 300 and 400 Amperes.

Our nearest distributor, listed on the opposite page, is ready to demonstrate the new D-C welder or any other A. O. Smith welding machine.

It will pay you to inquire of him—or to write direct for descriptive literature. Address:
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Welding Products Division, Dept. WE-951
Milwaukee 1, Wisconsin

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Made *by* **Welders . . .** *for* **Welders**

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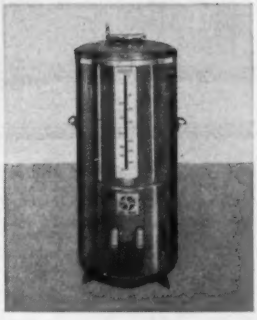

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HEAVY DUTY, GENERAL PURPOSE AND UTILITY

A-C WELDERS

A COMPLETE LINE OF NEMA-RATED A-C WELDERS

These welding machines were designed originally to meet the needs of A. O. Smith's own welding requirements—the requirements of the world's largest user of welding as a production tool! Commercial expediencies were not in the picture!

As a result A. O. Smith Welders exceed NEMA requirements and excell in performance, length of operating life and overall economy.

Your best choice in welders is an A.O. Smith welder.

- **Heavy-Duty A-C Welder (top) available in 300, 400 and 500 Amps. models, all with 75 volts open circuit.**
- **General Purpose A-C Welder (left) available in 150, 200 and 250 Amps. models, all with 56 to 80 volts open circuit.**
- **Standard A-C Welder (right) in 400 Amps. model with 75 volts open circuit . . . for all purpose use in any shop.**

Not shown—Utility A-C Welder has a range of 25 to 180 Amps. with 53 to 65 volts open circuit.

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Made by Welders . . . for Welders

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HANDLE MORE JOBS AT LOWER COST with...

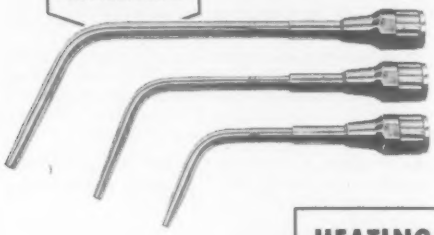
K-G's NEW GENERAL PURPOSE AP WELDING & CUTTING COMBINATION

AP WELDING TORCH

Heavy duty, positive pressure, for all fuel gases. Tip sizes 00 to 10 (drill sizes 76 to 30). Choice of universal mixer with swaged tips (3 of 12 shown above), or API individual mixer and tip assemblies (3 of 12 shown below). Flexible extension with separable tips also available.

Versatile, Rugged, Efficient—Takes a Wide Variety of Attachments Designed to Suit Your Fast-Changing Requirements

WELDING



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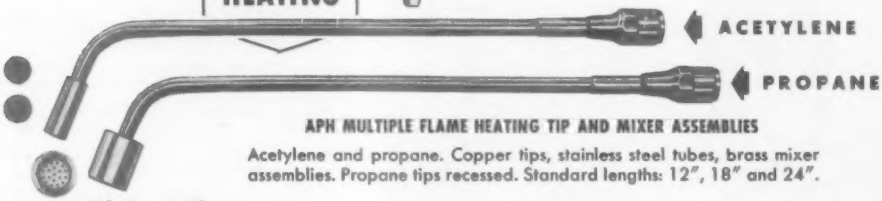
AP CUTTING ATTACHMENT. 75° or 90° head. Easily attached. High flashback resistance. Cutting range: ⅛" to 6".

HEATING

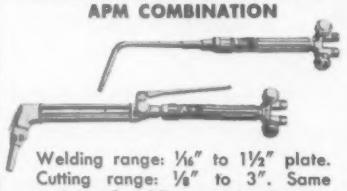


APH MULTIPLE FLAME HEATING TIP AND MIXER ASSEMBLIES

Acetylene and propane. Copper tips, stainless steel tubes, brass mixer assemblies. Propane tips recessed. Standard lengths: 12", 18" and 24".

Also see the

NEW, LIGHT and MEDIUM DUTY APM COMBINATION



Welding range: 1/16" to 1½" plate. Cutting range: ⅛" to 3". Same variety of welding and heating tips as for the AP Combination.

THE BEST BUY FOR TODAY... is the one that will fulfil TOMORROW'S needs too! Welding, cutting, silver soldering, heating—with the new AP Combination you can take on new problems *without* buying a lot of special equipment. You get a choice of welding tip types, each with a wide range of sizes. You get the versatile AP Cutting Attachment. *And*, as inexpensive optional equipment, you can get the handy flexible extension (not shown), and your choice of heating tips!

SEE YOUR K-G DISTRIBUTOR or write to

K-G

A UNIT OF Air Products INC. OXYGEN GENERATING EQUIPMENT

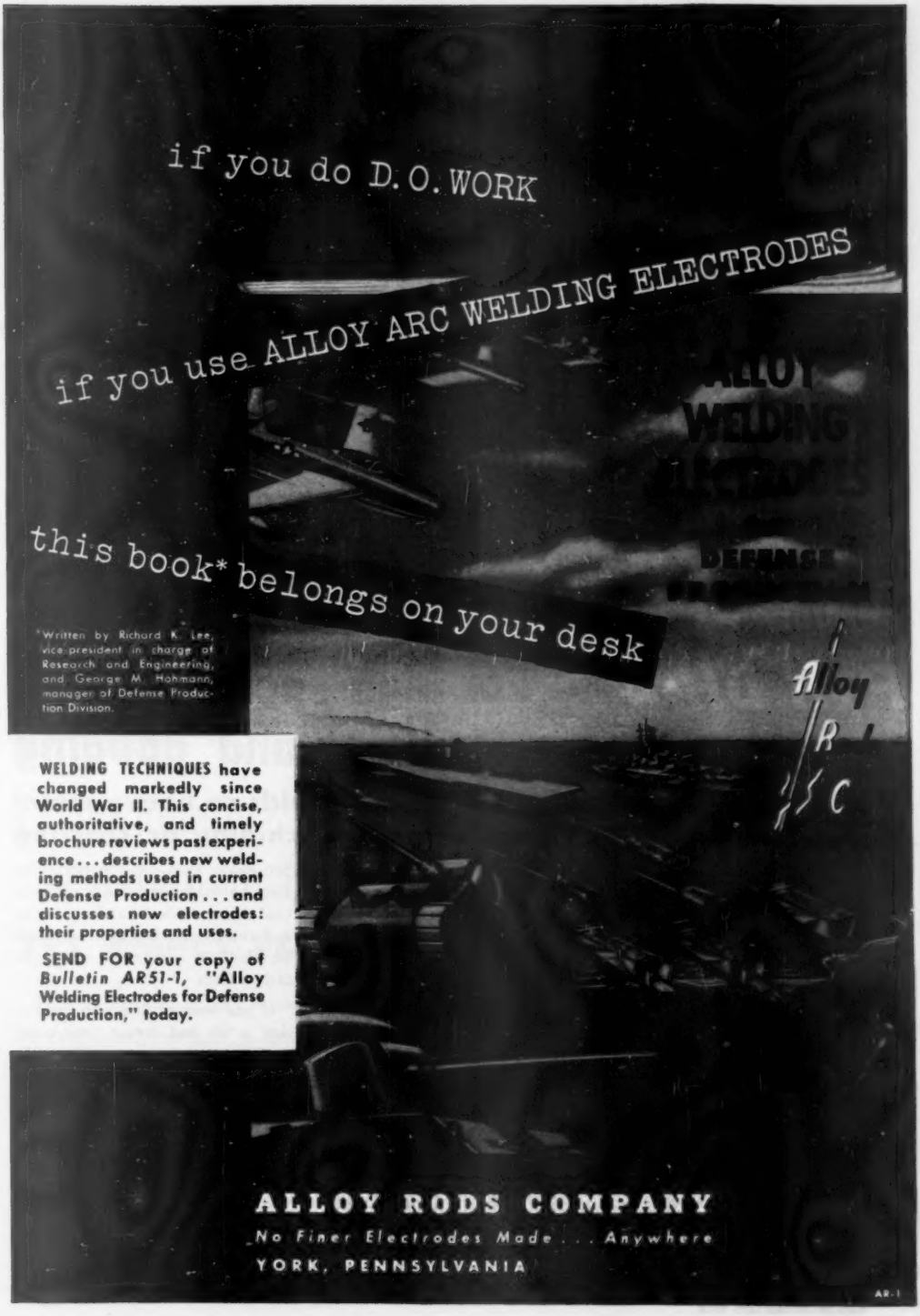
THE K-G EQUIPMENT COMPANY (Inc.)

Dept. A, 50 Broadway, New York 4, N. Y.

Sold in Canada under the name "WELDCO" by Welding and Supplies Co., Ltd., Montreal and Toronto

NATIONAL WELDING SUPPLY ASSOCIATION MEMBER

K-G ...Since 1914, symbol of satisfaction on GAS WELDING AND CUTTING EQUIPMENT


if you do D.O. WORK
if you use ALLOY ARC WELDING ELECTRODES
this book* belongs on your desk
*Written by Richard K. Lee, vice-president in charge of Research and Engineering, and George M. Hohmann, manager of Defense Production Division.
WELDING TECHNIQUES have changed markedly since World War II. This concise, authoritative, and timely brochure reviews past experience . . . describes new welding methods used in current Defense Production . . . and discusses new electrodes: their properties and uses.
SEND FOR your copy of Bulletin AR51-1, "Alloy Welding Electrodes for Defense Production," today.
ALLOY RODS COMPANY
No Finer Electrodes Made . . . Anywhere
YORK, PENNSYLVANIA
AR-1

JIM, HOW ARE WE GOING TO DO ALL THIS CUTTING AND WELDING... AND STILL MAKE DELIVERY ON TIME?
THAT NEW P&H ELECTRODE IS THE ANSWER, BILL. DH-4, THE FASTEST ROD WE'VE EVER BURNED!

NEW P&H DH-4 Electrode

For high-speed welding — cutting and gouging

...perfect X-Ray welds on heavy metal sections without machining or scarfing

This is the most unusual rod ever developed. It has so many applications that the American Welding Society does not have an AWS number for it.

Because of its wide range of usefulness the new DH-4 rod has shown outstanding economies in welding time and costs.

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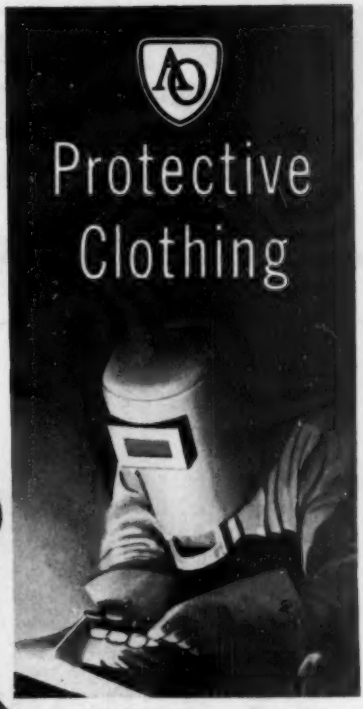

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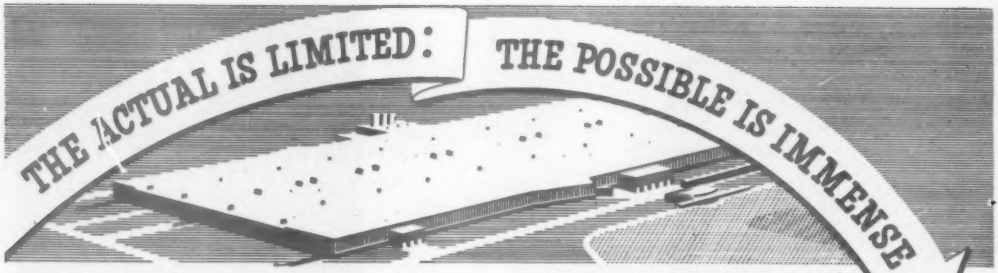

NEW LINCOLN PLANT CREATED BY INCENTIVE-INSPIRED CO-ACTION IN DEVELOPING POSSIBILITIES IN PRODUCT

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STEEL DESIGN SAVES MATERIALS AND MAN-HOURS ...CUTS COST 60%

WHEN a design utilizes the economies of welded steel, it can be produced for less cost because:

With welded steel, material costs are less. Only 50% to 25% as much metal is required. And, pound for pound, steel costs 75% less, giving an initial 7-to-1 cost benefit with which to start your designs.

With welded steel, fewer man-hours are needed for fabrication regardless of quantity produced. Smaller lots can be manufactured economically using simple tools. As quantities increase, designs can be modified further to replace some welding with bending, thus further reducing production costs.

Wherever costs with steel designs are higher, invariably the designs have fallen short of achieving the ultimate in savings possible with arc welding, or the products have been "over-designed." A restudy of every design by production engineers, before it becomes "frozen" for manufacture, helps eliminate costly details.

Your Lincoln Welding Engineer will gladly assist in analyzing your product requirements to cut costs.

Fig. 5—Steel Stamping from light gauge metal is formed in a die and welded. Weight is cut to 2 pounds . . . cost to 22¢ . . . a saving of 62% over Fig. 2. Saves 85% over Fig. 1.

Fig. 4—Saves 16% Cost over Fig. 2 by replacing tubing with simple "U" formed from bent steel strap. Holes are prepunched prior to welding. Weighs 2½ pounds . . . costs 49¢.

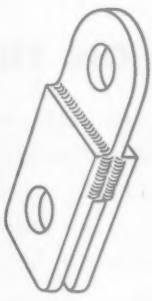


Fig. 3—Uses Sheared Steel Strip to cut 10% from production costs, as compared with Fig. 2. Requires only simplest of fabricating equipment. Weight is 3 pounds . . . costs 54¢.

the ACTUAL

Fig. 1—Original Design. *Machine clevis weighs 7 pounds . . . requires drilling, boring, reaming and spotfacing operations. Costs $1.45 for material and labor.*

increasing the YIELD

Fig. 2—Welded Design Saves 60% Cost. *Fabricated from tubing and steel strap. Needs only fast, simple punching operation. Weighs 3¼ pounds . . . costs only 58¢.*

the IMMENSITY of the POSSIBLE

Lower Costs Regardless of Quantity Produced

SEE HOW STEEL DESIGN CUTS COSTS STILL FURTHER

Machine Design Studies are available to designers and production men. Write on your letterhead to Dept. 79,

THE LINCOLN ELECTRIC COMPANY

CLEVELAND 1, OHIO

ESTABLISHED 1916 THE WELDING ENGINEER SEPTEMBER, 1951

Confusion Worse Confounded

WEIRD and wonderful things are happening these days. Most of them seem to originate in some branch of the federal government. It is extremely difficult to figure out why so many unnecessary obstacles must be thrown in the path of our defense effort.

Some of the half-baked deals being cooked up in Washington seem to be designed expressly to make life miserable for everyone connected with the manufacture and distribution of welding equipment. One of the best examples has been ironed out to a certain extent, but it was so asinine we wonder how it was ever allowed to come into existence in the first place.

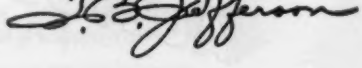
Early in NPA activities, the decision was reached to build 10,000 new freight cars every month. Some 300,000 tons of steel a month were allocated for this purpose. The steel was specified as plates and shapes. After the allocation had been made, it was found that no steel had been allotted for welding electrodes. Accordingly, 10,000 tons of steel a month were allocated to join the plates and shapes into freight cars, and everything would have been rosy had not some brainless bureaucrats intervened and rescinded the last allocation on the grounds that the steel for welding electrodes was not needed. The question of how the component parts of the freight cars were to be joined never troubled these brilliant thinkers. Since the freight cars obviously could not be built, eventually some steel was allotted for joining purposes.

HERE'S an almost equally asinine deal that may bring about gasoline rationing next year. Secretary of the Interior Oscar Chapman says that gas rationing may become necessary unless more steel is allocated to the petroleum industry. He ought to know because he doubles in brass as the petroleum administrator for defense. But apparently Mr. Chapman's right hand doesn't know what his left hand is doing because he has the say so on who is to cut in on the oil industry's share of steel. He issues the allocation orders that let the oil companies buy steel pipe. If they need more steel, all he has to do is to okay the orders and they'll get it.

Right now one of the big problems facing the petroleum industry is lack of drill pipe. Yet, I am told, there are 5,400 tons of steel pipe manufactured expressly for oil-well drilling that is gathering dust in Los Angeles warehouses. The California oil companies can't get it because Mr. Chapman won't issue allocation orders to them. Yet it's Mr. Chapman who insists that the industry must have more steel. He and his crew also wail that "unless there is more steel for pipe there cannot be more home heating gas." Are the bureaucrats deliberately trying to create chaos in one of our most essential industries?

ANOTHER example is in electric power. The Secretary of the Interior has ordered the Defense Electric Power Administration to allocate copper and aluminum to Rural Electrification co-ops. The REA is proposing to build a $71,000,000 power distribution system, which it will lease to the Southwest Power Administration. But Congress has already refused an appropriation to Southwest for this job on the grounds that it would duplicate existing systems. If Secretary Chapman gets away with this scheme, it will consume 34,750,000 lb of copper, 45,000,000 lb of steel, 3,000,000 board feet of lumber and 3,000,000 lb of hardware—all critical items. These materials are available to private industry for construction only when it can prove a defense need and then account for every pound consumed. Is duplication of an existing distribution system necessary to our defense effort?

We don't know whether this sort of thing is all part of a deliberate and diabolical plot against the American people, or whether it merely reflects poor head work. What we do know is that less gobbledygook and more common sense is badly needed in government. We are growing extremely tired of bureaucrats who wring their hands and cry crocodile tears publicly over self-created crises and emergencies. And we are tired of national leaders whose sole ability seems to be to lead us into confusion worse confounded.



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flame-cut to ± 1/16" Tolerance

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- The flame-cut plates are ready for welding without grinding, finishing, bridging, or beading!
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- No heavy investment needed; the Acetogen Process utilizes standard, readily-available, low-cost equipment and tools!
- Experienced flame-cutters become qualified Acetogen operators within a few days!

AND THAT'S JUST ONE of the many amazing facts about the Acetogen Process—the only really new flame-cutting development in years!

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We can produce results just as eye-opening in *your* plant. We have the gas and nozzles, and the personnel with the "know-how"; we will act either as consultants, or as sub-contractors doing the job in your plant. We invite your inquiry. Acetogen Fabricators, Inc., 822 Commercial Trust Bldg., Philadelphia 2, Pa.

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TUBE TURNS OF CANADA LIMITED, CHATHAM, ONTARIO... A wholly owned subsidiary of TUBE TURNS, INC.

New Ford Power Plant features welded piping

Power station for Ford Motor Company's giant new engine plant and foundry, now being built in Cleveland; F. A. Fairbrother —Geo. H. Miehls, Architect and Engineer; Albert Kahn Associates, Consultants. Engine plant will be equipped with the last word in automatic machinery—to save production man-hours. The designers believe in saving maintenance man-hours too. Thus at the power plant, which will supply 360,000 pounds of 150-lb. steam per hour for heating and process, an all-welded piping system with TUBE-TURN Welding Fittings and Flanges was specified. Welded steam, air, and condensate lines are permanent and leakproof.

Here the 18" steam main from the power plant leads to a fabricated "Y" connection, then through tunnels to foundry and engine shop. One side is stepped down through a TUBE-TURN Welding Reducer to a 16" line; the other side through another TUBE-TURN Welding Reducer to a 12" line. Special "Y" connection was made by cutting and welding two 45° Welding Elbows, a job that calls for uniform wall thickness and concentricity throughout the fittings—a point of pride with TUBE TURNS, INC.

In engine shop, smaller lines designed to carry coolant oil to machine tools are also welded. Wide range of TUBE-TURN Welding Fittings and Flanges—including more than 4000 different items—simplifies installation job. Leak-proof piping will free maintenance personnel for other work.

Despite close quarters in tunnel, fabrication goes ahead swiftly. Welders and contractors like to use TUBE-TURN Welding Fittings because they know that dimensions are always accurate, thus line-up is easy. Welded lines can be fitted closely together, will make for a neat installation. With no flanges to work around, insulation can be applied easily.

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Making a Ship Grow

(See also Front Cover)

BY WILLIAM C. HENZLIK

STOCKPILES of iron ore just can't be too big this year to supply the open hearths and blast furnaces of our steel industry. With huge defense needs plus big civilian orders, every extra pound of ore delivered to the mill before cold weather freezes up the Great Lakes means more steel faster and cheaper this winter.

To add to its ore-carrying capacity for the 1951 season, Inland Steel Company last year decided to lengthen one of its biggest ships, the 600-ft *Philip D. Block*. Putting a 72-ft new midsection in her hull would make her length only six feet short of the longest on the Great Lakes, Inland's *Wilfred Sykes*, a 678-ft giant. The *Block's* ore-carrying capacity would be increased from an average 12,800 tons to more than 14,000 tons per trip. In a normal 33-trip season, this would mean she'd haul 468,000 gross tons against a previous 422,000 tons.

Why Block Was Chosen

According to officials at the south Chicago shipyard of American Shipbuilding Company, you can't just lengthen any ship that comes along. A survey of the entire Inland Steel lakes fleet showed that the scantlings (dimensions) and rugged construction of the *Block* would be best suited for lengthening. Her breadth was great enough to take the longer length and still maintain good buoyancy, good steering characteristics and structural integrity.

Bow of the *Philip D. Block* nosed into the drydock for the "growing" operation last January, and preparations commenced immediately. As soon as the dock was emptied of wa-

1 WIDENING GAP in the ship shows as yard workers pull off her forward portion. Cables are to hold back bow if it gets hard to handle

2 EXACTLY 72 FT apart, the two halves of the ship await their new midsection. This picture was taken in 15-below-zero winter weather

3 NEW PLATES RISE into place on the midsection. Note scaffolding aft for welding on the big reinforcing straps almost the length of ship

ter and the ship settled on the blocks, scaffolding was erected around the midsection to support flame-cutting operators and oxyacetylene cutting equipment.

All cutting was done manually with heavy-duty oxyacetylene torches. The normal oxygen pressure was 45 psi and the acetylene pressure 10 psi. All told, 11,191 cu ft of oxygen and 4,940 cu ft of acetylene were used.

The cutting crew numbered ten men. The deck plates were cut by one man working on each side simultaneously (Fig. 4). Cutting went on simultaneously with a man on either side of the shell (side plating of a ship). Similarly, inside the ship, two cutting operators severed the tank tops (bottoms of the ore-carrying compartments) and longitudinals of the ship's structure. The other four men cut side tanks (sides of the ore-carrying compartments) and miscellaneous other structure across the section to be separated. The ship was in two pieces in five working days.

4—FIRST step in severing ship was to cut through deck plating

5—3-IN. CUT prevented trouble when sections were floated apart

Cut Steps in Plates

Because of the unique nature of this cutting and adding job, every step in the procedure had to be planned for as many possible happenings as could be foreseen. For instance, Yard Superintendent J. M. Dalzell and Yard Foreman Bruce Crawford surmised that when water was let back into the drydock to permit the two halves to be pulled apart, the back edge of the front severed portion would lift up in the water higher than the bow. This is because of the finer lines of the bow, less beam, weight of the anchor, deck house so far forward, etc.

It didn't seem wise to leave only a narrow gap, the normal width of a flame-cutting kerf, between the two sections. The uneven floating action plus rotational movement in a vertical plane of the front section would surely impinge the plating edges, resulting in torn and bent plates. There would also be a powerful misaligning force to overcome.

To avoid all this, a section 3 in. wide was cut out completely through the ship, across the tank tops and across the structurals (Fig. 5). Also, the side plating was cut in vertical steps, about 3 ft high with 3-in. horizontal cuts, ascending toward the aft portion (Fig. 6). When the front part tended to lift, it would thus move up and away from the aft part. These precautions worked out as planned; there was no grinding or tearing contact when the drydock was filled with water.

It was estimated that the draft of the forward end when floating would be 7 or 8 ft. But the tanks are 5 ft deep so, obviously, water would be flowing over the bottom of the ore compartments. To keep it out, a temporary bulkhead was welded across the width of the forward part of the ship, making, in effect, a separately buoyant vessel.

How Alignment Was Kept

From first to last, both in building a ship and in making major alterations, its alignment must be kept as perfectly as possible. To manage this on the *Block*, a combination of methods was used.

Basis for all alignment efforts was to be the *Block's* aft portion. So that this would be a true basis, the aft portion was carefully aligned with the drydock before the ship settled down on the blocks.

Six targets were mounted on the ship as she lay on the blocks in drydock; one on the centerline of the after part of the ship; one on the centerline of the forward part; one each on both sides of the deck and on both edges of the cutting line. By sighting through a transit at these targets, the American Shipbuilding men established a level plane parallel to the base line, which could be used as a reference after the sections had been cut apart and moved.

Once the *Block* was on the blocks, it was important that her aft portion did not move until the complete remodeling job was finished. But how could this part be kept immobile when water was let into the drydock again? Certainly lining up would be a fearsome job if both parts of the severed ship were allowed to float.

The answer was to "sink" the aft portion, or rather just not let it float again until everything was finished. Two large manholes were flame-cut into the bottom of the No. 6 tank and two in the bottom of the No. 7 tank in the aft portion. When the drydock was flooded, water flowed up inside the aft portion and kept it steady as a rock.

A steel platform was constructed at the head end of the dock with a notch in it exactly 72 ft from the bow of the unsevered ship. This notch would receive the bow after it had been towed away from the aft portion.

For added insurance, in case the front part of the ship got out of control as it was towed, provision was made to keep it physically attached to the aft portion. Steel pads for "pad eyes" were welded to the decks of both parts, to allow the two parts to

6—FLOATING front portion of ship (right) is ready to be towed to the front end of drydock. Aft end was "sunk" to keep it steady for alignment

7—WELDING bracing and alloy plates for ship's new midsection

be joined with 1-in. cables (see Fig. 1). Cable lengths were measured so that when and if the cables became taut, exactly 72 ft would separate the two parts. As it turned out, the forward part of the ship did not get out of control.

Manpower for Hauling

Now that the ship was cut in two, it was necessary to separate the halves by the required 72 ft. Cranes, winches or men were available, and it was mandatory to do it the safest and easiest way.

Good old manpower was chosen—for this reason: If men on hawsers could overcome the inertia of 1,600 tons of floating steel and start it to move, then the same men could stop it. If mechanical means were used, the more powerful and faster pull might not be as quickly reversible since inertia varies as the velocity squared.

Temperature of the air was 15 deg below zero on the day that separation of the halves was to take place. Nevertheless, water was pumped into the dock at 8 a.m., and the forward part of the ship commenced to stir on the blocks. As anticipated, the aft end of the forward severed section floated first, leaving the bow fast on the blocks. It was necessary to pump water into No. 2 and 3 tanks near the flame-cut end. This pulled the high end down and the bow up so that the whole forward portion floated free.

The men walked and pulled slowly and steadily on the lines (Fig. 1) and the forward part of the ship moved gracefully ahead into the steel platform across the front end of the dock. The bow nudged into the notch, and the rear end of the forward part was exactly 72 ft from the "sunken" aft portion of the ship (Fig. 2).

To make sure that the front portion settled onto the blocks again in alignment with the centerline of the aft portion, the men used wooden shores. These heavy timbers were cut to exact length to just fit between the ship's side and the drydock (see right of front cover illustration). The shores were wedged in between each side of the dock and the corresponding sides of the floating front portion. This lined up the flame-cut edge of the forward part perpendicular to the centerline of both the stationary aft portion and the front portion.

When the dock was pumped out, the front portion settled in the blocks ready for a new midsection. A check with the transit showed it was only ¼ in. off the line. The ticklish moving job had taken five hours.

Special Steel for Bottoms

For the outer shells, longitudinals and other structure of the new midsection, ship-quality steel plates were installed (Fig. 3). However, Inland specified that the tank tops and side tanks have copper-alloy, intermediate-manganese steel plates to withstand the severe abrasion and hard usage to which ore compartments are subjected.

In Fig. 7, the bracing and tank plates for the new midsection are being welded in place. Weld Shop Foreman Frank Talbot supervised distortion control procedures when the plates were welded in the new section. The abnormally cold weather gave some trouble to the weldors. On the coldest days, plate edges were brought to a 600-deg preheat as a precaution before welding.

Shell construction was of the riveted-frame type with welded butts. Welding was done before riveting. Strongbacks were placed across the joints for alignment in welding. One end of the strongback was tack welded to the plate for restraint while the other was left free except as it was held down by bolts in elongated bolt holes.

The welded deck plating was 1 3/16 in. thick and was welded in six passes with ¼ and 5/16 in. electrodes at 400 amp. Each pass was well cleaned with slag hammers before the succeeding pass was laid.

Coupons were cut out of numerous deck and side joints and etched to test weld penetration. The weldors,

(Continued on page 50)

SEAM WELDER in Solar Aircraft Co. San Diego plant is serviced by water recirculating tank at the right

SPECIAL PANS installed on spot and seam welders catch the cooling water for the recirculating system

Cool Water for Spot Welding

Solar Aircraft Co. will save about $17,000 per year from the ingenious method developed to recirculate the water used to cool spot welders and other equipment.

It's astonishing how much water is needed just to cool one spot welder. The average at Solar Aircraft Co. is 5 to 17 gallons a minute for *each* of its 66 spot and seam welders. Formerly Solar's San Diego, Calif., plant consumed about 12,000,000 gallons of water every month—enough to fill a cylindrical tank 200 ft in diameter by 51 ft high. Ninety per cent of this very considerable volume of liquid was used for cooling purposes on welding or other operations.

To help meet a critical water shortage at San Diego, Solar has developed an ingenious method of recirculation. Though the installation is only partially completed, the current saving in water is over 2,000,000 gallons a month. Ultimately, 6,000,000 gallons a month—half of the company's former water use—are expected to be saved.

It's Clean Water

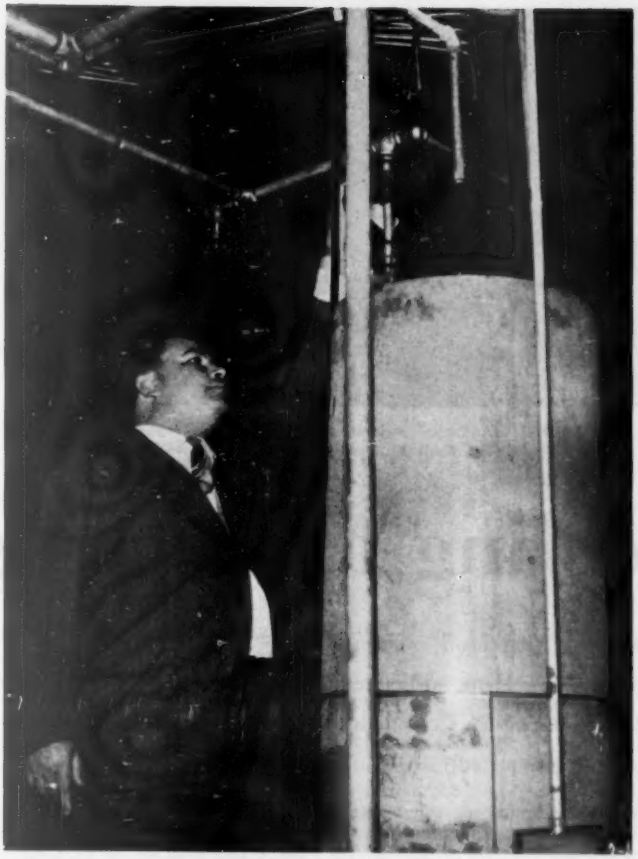
What makes it possible to recirculate cooling water is that it is still clean water after it has done its job of taking away unwanted heat. It is only necessary to allow the water to cool, and it can do the work all over again. With this fact in mind, Del Wolfington, Solar plant engineer, supervised the design of portable pump-and-tank units that would accomplish the recirculation without having to cut through floors or otherwise tear the building to pieces.

First idea was to hook up every welder to a pump and pump the water into an ordinary 50-gallon barrel. No go. It wouldn't work because the water became hard and contaminated with rust. So the present system was evolved in which the water is cooled in a rustproof stainless container and a powdered water softener is added as needed. Because of evaporation, it isn't possible to save all of the cooling water, but from 50 to 90% of it can be saved. Each recirculating unit cools the water, softens it and automatically keeps the water level at the required point.

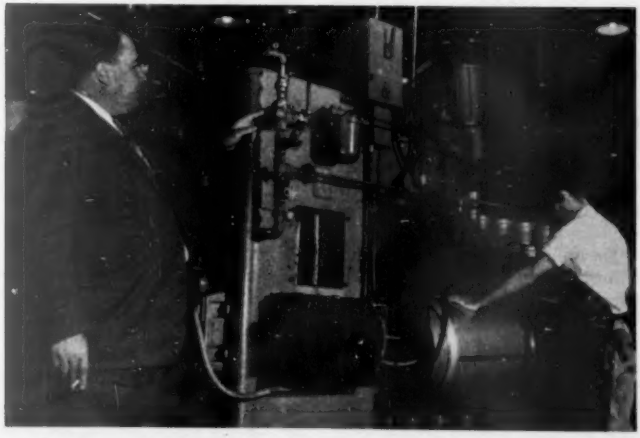
Basically, a recirculating unit consists of a centrifugal pump and a 50-gallon stainless-steel tank. The tank is made at Solar by rolling and seam welding stainless sheet stock. A float valve keeps the water at the required level by admitting fresh water to offset the evaporation losses.

The welding units are equipped with large pans that catch the cooling water after use and drain it into the recirculating system.

For a spot welder, the recirculating unit, including tank, pump and the needed piping, costs Solar about $285.



DEL WOLFINGTON, plant engineer, inspects the piping that leads into a 50-gallon stainless-steel tank for a Solar-built water recirculating unit



SHUT-OFF VALVES to halt water flow when welder stops operating are installed on machines for which a recirculating system is not practicable

In some instances, a recirculator can handle more than one welder. On other machines, recirculation was not found practicable—either the water gets too hot to be used again for cooling or the parts being welded are too large to allow the construction of pans to retrieve the water. On these machines, electrically operated water control valves were installed to shut off the flow when the machine stops operation.

A 23% Return

The company's investment in the equipment for spot-welding machines alone has already totalled about $25,000. However, the 2,000,000 gallons a month being saved at the present stage would cost $480 at local water rates in San Diego. That's $5,760 a year—23% of the cost of the equipment. Any investment that can yield a 23% return is definitely desirable.

The prospective 6,000,000 gallons per month saving would mean a monthly dollar saving of $1,440 or $17,280 a year.

Surveying for still further possibilities of water conservation, Solar has rented water meters from the City of San Diego. These are being used to check consumption department by department. A consulting engineer has been retained to study the problem and offer additional suggestions. An employee patrol constantly checks the system for leaks and wastage and also gathers data to aid in the continuing study of water-saving possibilities.

The same principle of water recirculation is used in Solar's stainless-steel foundry and in the compressor station. The hundreds of gallons of water used for cooling in the compressors were formerly dumped into the bay. Now all of this water is pumped back to other Solar departments for re-use.

According to Solar's president and general manager, E. T. Price, the water conservation program is not only economical but it has paid extra dividends in community good will. At present, Solar does not plan to manufacture water recirculating equipment for sale. However, the firm indicates that it is willing to answer queries from other companies who are interested in making similar installations.

1—BELL-HOLE welding was done on pipes strung out at the beach

2—STRINGS at left are welded, tested and joint-wrapped. Set-up men steady the oil-drum floats as a string moves down rollers and is launched

Welding a Seagoing

Imagine yourself doing overhead welding while lying flat on your back on an 8-in. plank suspended over ocean waters from a rocking, pitching LCT. And the weld has got to be good because it can't be tested.

BY R. C. LEDFORD
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PIPE LINES have long been laid under rivers and even through considerable expanse of lake. The 25-mile-long Lake Pontchartrain crossing of the United Gas Corporation's 16-in. line near New Orleans provides one example. This line, however, was put down in sheltered waters, and such factors as rate and direction of current flow, wind and weather effect and bottom changes could be calculated.

Into the Open Gulf

Far different is the pipe line pictured here, which runs out more than 12 miles into the open Gulf of Mexico. Neither the engineers of the Marine Gathering Co., Houston, Tex., who planned the construction, nor engineers of the contractor, the Submarine Pipe Line Co., Corpus Christi, Tex., could do more than guess at the hazards to be met in their undertaking to bring natural gas to shore from the production platform of the Pure Oil Co.

Seizing a Beach Head

First a working beach was constructed on the coast—little more than swamp and tideland—where the 8-in., ½-in.-wall pipe could be lined up and welded. True to Gulf performance, this artificial beach was once destroyed by the backwash from a hurricane, and all work had to be halted while the work area was reconstructed some ten yards farther inland from the earlier site.

The pipe, yard-wrapped against corrosion attack, was delivered by barges and unloaded at the beach site. Unloading was done by the LCT that was also used as the deep-water welding base. At the beach site, the pipe was strung out on timbers in sections that averaged 1,100 ft long. This multiple stringing enabled several crews to weld simultaneously, each taking one string and working from the end nearer the launching ditch to the far end. In effect, bell-hole welds were used in forming the separate joints into strings (Fig. 1). The height of the timbers on which the pipe was assembled and aligned afforded working space for the lower portions of the welds.

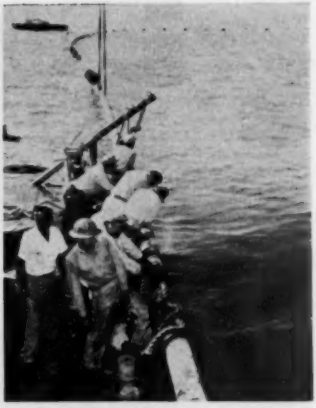
Each welded section was tested by hydraulic pressure to a figure far above that expected to be possible under operating conditions. The welds were hand-wrapped and doped, and then the entire section was checked with a "holiday" detector to locate any breaks in the corrosion-resistant coating. After all of the "holidays" had been carefully patched, the section was lifted over to the rubber-faced dollies on which it was positioned before being pulled into the water.

Going out to Sea

Laying procedure called for the line to be towed from the beach yard to the right-of-way, and there joined to that portion of the line already completed and lying on the floor—more exactly, the ooze—of the Gulf. The "drags" pulled out into the Gulf ranged from 2,200 ft to 6,600 ft, with the 3,300-ft length proving the most practicable with available equipment. Since the beach was long enough only

3—LINE from the Gulf bottom is suspended from supports on an LCT

4—TUGS FIGHT a swift current to bring in end of floating "drag"



5—CREW struggles to get end of "drag" into a clamp for alignment

Pipe Line

for 1,100-ft sections, two or more of these would be welded together. The welds were made after the farther end of the section being dragged had been brought even with the leading end of the next section.

To support the pipe in transit, oil drums carrying air at 10 psi pressure were attached to the line at approximately 17-ft intervals (Fig. 2). Each drum was held to the pipe by two steel straps. The straps passed through an ingenious cutter that could be actuated from the end of a line carried to the surface by a float.

Towed 12 Miles

If wind, weather and current were favorable after a "drag" was equipped with floats, it was towed some 12 or so miles through the Gulf waters and brought as nearly as possible into position as an extension of the line already laid. While the tugs were aligning the new drag, the LCT welding base was locating the end of the completed section. The submerged end was lifted and lashed to the side of the LCT (as in Fig. 3) so that the end to be welded would lie above the water where it could be worked on. The end was washed free of mud and the bull-plug used as a temporary closure was removed. Finally, the end bevel was dressed to insure clean metal and a uniform face for welding.

The floating segment, towed into approximate alignment, was maneuvered to where a sling could be passed around the inshore end. Fighting a swift current, the tugs brought the end up close to the LCT. A few barrel-floats at the end were released to provide more working room (Fig. 4).

Alignment under Difficulties

A little at a time, the end was raised and brought to welding distance of the positioned end of the completed section (Fig. 5). This alignment, a matter of seconds only on land, might sometimes require hours at sea.

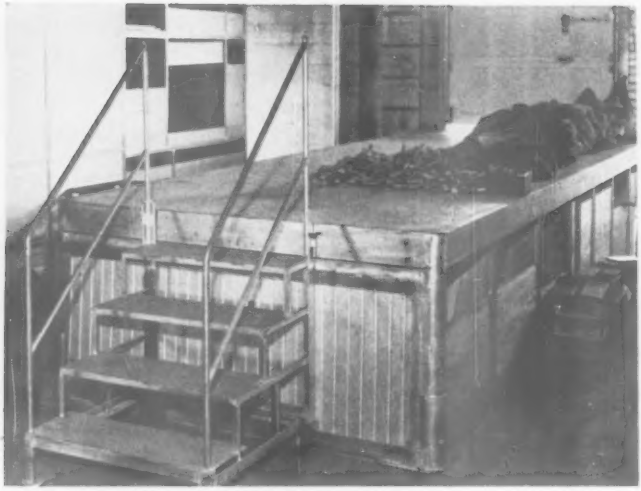
By a skillful combination of the relative motions of the end of the floating pipe, the LCT and the chain hoists used to take up the slack, an outside welding clamp was eventually located to hold the ends at the proper distance and alignment while the weldor made the tack welds and then ran up the filler and completion beads.

To work on this weld, the weldor had to sit astride the pipe for the upper portion of the job (Fig. 6) and then lie on his back on an 8-in. plank suspended over the water to do the lower part of the weld. All this while the floating base was rising and falling with the waves, rocking or pitching as the waves passed under the flat-bottomed vessel. Furthermore, the pipe itself was subject to the pull of currents. It tended to twist and turn against the hempen cables that held it in alignment and thus to work out of the grip of the jaws of the line-up clamp. It is doubtful if a more trying combination of obstacles could ever be devised.

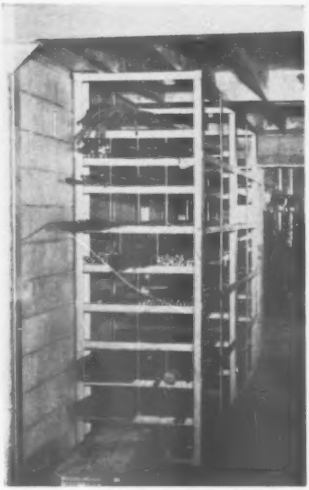
6—WELDOR sits astride pipe to do upper half of the tie-in weld

That this junction weld was anything but a routine job may be realized by a study of the time required to align the abutting ends prior to the actual weld. With good weather, favoring currents, a calm surface (no sea running) and lots of luck, the welding operation could be completed in an hour and a half from the time the submerged end was located. Several

(Continued on page 106)



1—TRAP DOORS in truck-high loading platform lift up to expose storage bins. Mobile welded stairway is locked to the platform by hinge pins



2—WELDED RACK to store bar stock. Note the vertical separators

New Kansas Plant Finds

"Too close to the woods to see the trees" is a good old proverb with many applications. It is just as true regarding people in the welding industry, as those elsewhere. Doubtless it accounts for the paradox that so many who make welding products don't make any intelligent use of welding in their own plants.

The new $100,000 plant of the Tweco Products Co., Wichita, Kansas, is a bright and shining exception. Every place you go, you will find that welding has been used to enhance the appearance, to save space or to insure greater safety. How welding was used to make bins, racks and other storage structures, to reduce a fire hazard, to speed up production and shipping is told in this article—*The Editors.*

BY T. B. JEFFERSON

WHEN YOU enter the shop of the new Tweco plant at Wichita, one of the first things you will see is the truck-high loading platform (Fig. 1). This welded platform was fabricated primarily from pipe and channels to support a concrete floor. Every so often there is a trap door divided into quarters. When one of the quarter-sections of the door is lifted, it exposes a bin below, used for receiving and storing materials. There are 16 bins underneath the platform, each approximately 3 by 4 by 3 ft.

Portable stairs make it easy to get up to the platform. These four-step stairs roll on two castors, somewhat like the portable steps used by air lines at airports. The stairs may be rolled against the platform or moved away from it when their presence presents difficulties. To insure that they will stay in place when wanted, a welded hinge-type lock is provided for each side of the stairs.

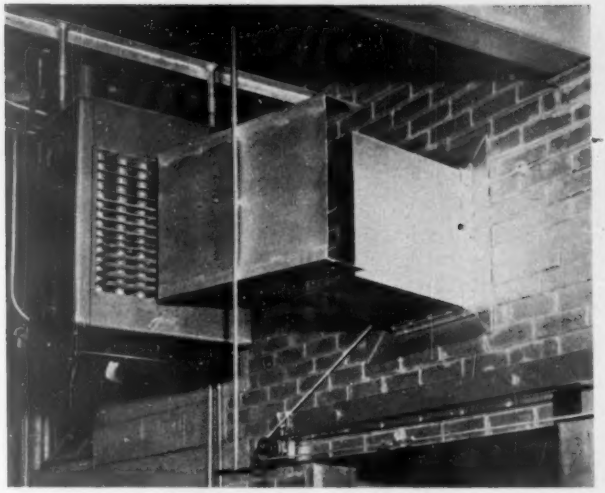
To the left of the shipping platform are other bins having a welded steel framework and steel shelves. These bins are likewise used for storage of loose stock. Boards are inserted in front of each bin, so the contents won't spill out. As the stock is removed from the bins, these boards are also removed in successive stages. Thus access to the stocked material is always easy.

RACK FOR BAR STOCK

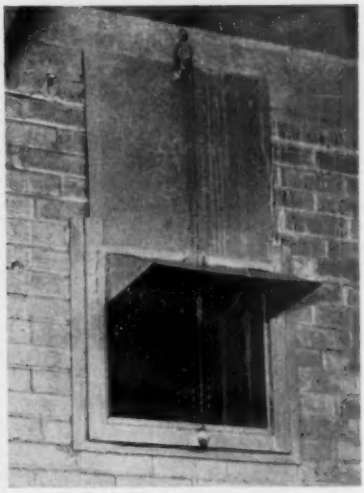
Moving from the loading area to the shop, you will pass the welded rack for storage of bar stock (Fig. 2). This rack has been fabricated from angles and flat bars. There are both vertical and horizontal angles. The flat bars are welded to the horizontal angles to provide vertical separators to separate the various items in storage.

To the left of this picture (Fig. 2) appears an excellent example of the use of pipe as a column. The steel beam that serves as the balcony support has been welded to the pipe column.

The painting department is always a hazard in any shop because of the



3—BUTTERFLY-VALVE is rotated by handle below to regulate the amount of heat deflected through three-sided duct into paint room



4—FIRE will melt fusible link, dropping door to seal opening to paint room

Many Uses for Welding

possibility of fire in this area. It should be designed to afford the utmost in fire safety. Naturally, it is not advisable to place open gas flames in the painting area. In the Wichita region, however, natural gas is the chief source of heat, and Tweco wanted to use gas unit heaters for this purpose. The question then was how to provide heat that would not constitute a fire hazard.

Butterfly Valve for Heat

Obviously, it was impossible to locate the unit heater in the paint room, so how was the heat to be brought into the department?

Welding and ingenuity solved the problem. First of all, a three-sided duct was welded to a frame and affixed to an opening in the wall (Fig. 3). A butterfly-type scoop was then made and fastened to a swivel on the ceiling so that it would be directly in front of the unit heater. Simple rotation of the swivel by a handle

Fig. 5 ←

WELDING is also used to join the many pieces of this mechanical paint dipping machine. Conveyor chain carries ground clamps and other products through dip and under infra-red lights for quick drying

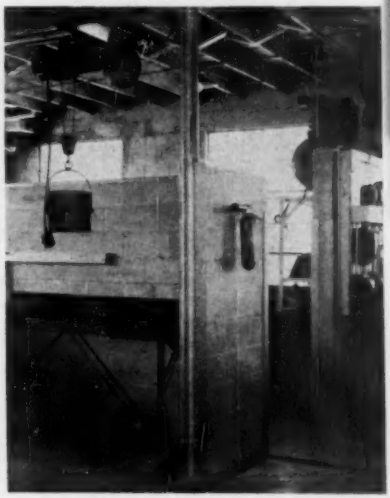


Fig. 6 →

STEEL angles protect edges of concrete-block wall from truck damage. Note how wall end is protected by the steel bars welded to pipe column

7—STAINLESS box (right of refrigerator) supplies cold water for drinking

8—SHIPPING ROOM also found uses for welding. Table top and framework are welded; steel shelves are supported by welded frames

makes it possible to deflect any amount of heat, up to the heater's full capacity, into the paint shop. The butterfly valve rotates through 180 degrees, making it possible to direct all of the heat, any part of it, or none at all into the paint room.

If a fire should break out in the paint room, the wall opening for the heater duct might allow flames to escape to the rest of the shop. To prevent this from happening, a welded steel frame was installed around the opening in the interior of the paint room (Fig. 4). The frame fits a flame-cut steel door, arranged to drop down over the opening in the event of fire. Ordinarily, the door is held open by means of a chain. The chain, however, has a fusible link, which melts when the heat becomes too great (212 F) and allows the door to drop. Another fusible link is connected with the paint room's big steel main door, which also closes automatically in the event of a fire. These two precautions insure that the flames will be confined to a limited area if a fire should break out.

Welded Paint Conveyor

Welding plays another important role in the paint room since it is used to join the many pieces of the mechanical paint-dipping machine (Fig. 5). Ground clamps and other products to be painted are carried through a dip and then under infra-red drying lights by a conveyor chain approximately 100 ft long. Each product hung on the chain has been properly dipped and dried by the time it has returned to the loading—unloading station.

Only one or two employees are needed to load the conveyor, which then functions automatically until the piece has been painted and returned to its starting point to be removed from the conveyor.

Walls of concrete blocks separate such areas as the plastic department, welding department, cleaning department, etc. Heavily loaded trucks, caroming against the doorway edges, could cause a lot of damage to the concrete. The walls, which vary from five to ten courses high, have been protected on their corners by welded angles. This is shown in Fig. 6, which also pictures the wall ends against one of the building's pipe columns. In the latter instance, protection for the end of the wall is provided by means of steel bars welded to the column.

Toward the left of Fig. 6 there is a welded bench and two welded buckets for the dipping room. These stainless-steel buckets can withstand the highly corrosive acid bath required to bright-finish brass and copper parts.

At the right of the picture (Fig. 6), seen through the doorway, is the welded steel stand that supports the air compressor. Tweco's experience has been that air compressors mounted off the floor in this manner may be maintained easier and will render greater service. One reason is that the air is cleaner near the ceiling, which reduces wear on the compressor. Also the compressor is out of the road of the workers so it's practically an impossibility to bang anything into it. This is by no means the case with floor-level-mounted compressors.

Cold Water to Drink

The shop canteen sells milk, candy bars and soft drinks to employees at a nominal cost. These are stored in a household electric refrigerator. Since the employees also require a drinking fountain, the management thought it would be nice to give them chilled water from the refrigerator. A three-gallon tank was fabricated of stainless steel and slipped into the refrigerator beside the ice-freezing compartment. Holes were then drilled through the refrigerator walls for an inlet pipe connected to the city water main and an outlet to the drinking fountain. Now an employee can get a nice, cold drink of water directly from the refrigerator (Fig. 7).

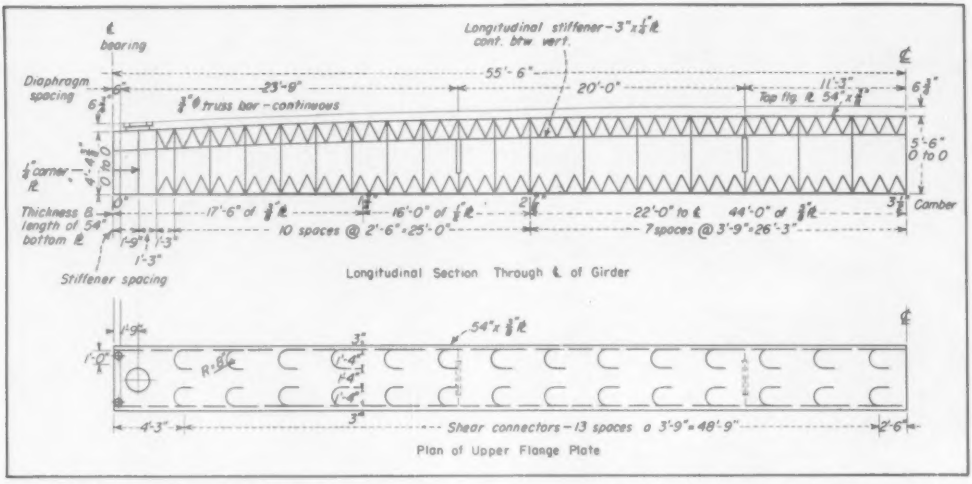
The last place visited in the plant was the shipping room (Fig. 8), which also has its share of uses for welding. The shippers and packers work from a table having a welded steel top and a welded framework able to withstand the rugged shipping service. The shelves of this room are supported by welded steel frames, while flat bars are welded in place to provide the separators for cartons of different sizes.

To expedite the filling of orders, the familiar resistance-welded grocery cart is used to collect the various electrode holders, ground clamps and cable connectors that may be required for an individual order.

TWO ALL-WELDED steel box girders carry the King County bridge across the Snoqualmie River. Span is 110 feet

Box Girders for Bridge Support

UNDERSIDE OF BRIDGE, looking up at bottom flanges of girders. These were made by butt welding 54-in. plates


℄ bearing
Longitudinal stiffener – 3" x 1/2" ℄ cont. btw. vert.
Diaphragm spacing
55'-6"
20'-0"
11'-3"
Top flg. ℄ 54" x 3/8"
3/4" ϕ truss bar – continuous
5'-6" O to O
1/4" corner ℄
Thickness & length of 54" bottom ℄
17'-6" of 3/8" ℄
16'-0" of 5/8" ℄
22'-0" to ℄
44'-0" of 3/8" ℄
Camber
10 spaces @ 2'-6" = 25'-0"
7 spaces @ 3'-9" = 26'-3"
1'-3"
Stiffener spacing
Longitudinal Section Through ℄ of Girder
54" x 3/8" ℄
R = 8 1/2"
Shear connectors – 13 spaces @ 3'-9" = 48'-9"
Plan of Upper Flange Plate

LONGITUDINAL SECTION of half of box girder, showing arrangement of the truss bars, and plan of upper flange

Unique box-girder construction of three welded bridges in western Washington has effected notable savings: the two-lane, 110-ft King County bridge cost only $37,440.

THREE new all-welded bridges in western Washington state are unique because of their box-girder construction. This revolutionary design is the creation of Homer N. Hadley, Seattle consulting engineer. It uses the reinforced-concrete slabs, through welded shear connectors, to act structurally with the two box girders. Consequently, there is a notable saving in steel and erection time. As an example of the cost savings, the contract bid for the first bridge was only $37,440.

Two of the three bridges were built for the King County highway department. The other is being constructed for the Washington state highway department by Manson Construction and Engineering Co., Seattle.

GIRDERS SPAN 110 FT

The first bridge to be erected, one for King County, carries a two-lane highway across the south fork of the Snoqualmie River at North Bend, Wash. This is a two-lane highway bridge, 110 ft long. The T. N. Buchanan Co., a Seattle contractor, made the low bid of $37,440. The contract called for the erection of the new bridge complete, with roadway slab and hand rails, and also included the removal of the old bridge, erection of a detour bridge and the placing of a small quantity of rock rip rap.

Isaacson Iron Works, of Seattle, was the subcontractor for the two welded box girders. The bid for these was $18,597.

The box girders were fabricated with a 3/8-in. top flange plate and bottom flanges that varied in plate thickness from 3/8 in. on the end sections to 5/8 in. in the center. Both top and bottom flanges were made by butt welding 54-in. plates together to obtain the desired length.

The side (web) plates were 1/4 in. thick. Each side plate was made by butt welding three 30-ft-long plates and one plate 21 ft 1 in. long. The short plates of the two sides were placed on opposite ends of the girders so that none of the splices would be in alignment in the final welded structure.

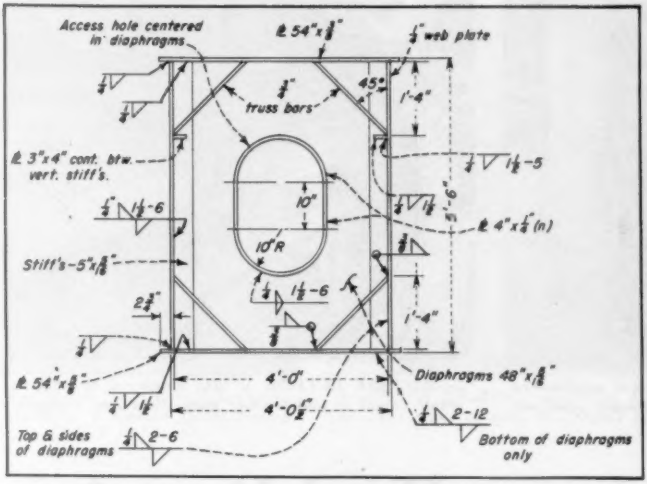
STIFFENERS AND BRACES

The box section has a standard width of 4 ft 1/2 in. from end to end. The height, however, varies because of the camber; height is 4 ft 4 3/4 in. at the ends and gradually increases to 5 ft 6 in. at the center. The bottom edge of the web plates was cambered 3 1/2 in. at the center. The 1/4-in. web plates are extremely light for bridge construction. To keep them from distorting or bending, they were strengthened by vertical and longitudinal stiffeners. Vertical stiffeners measured 5 by 5/16 in. and longitudinal 3 by 1/4 in.

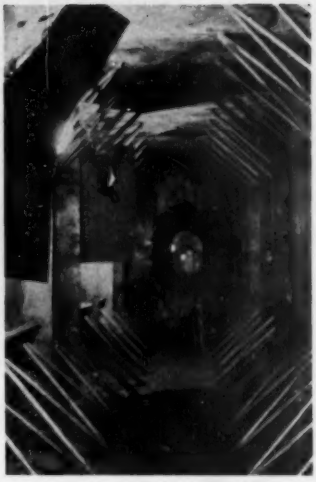
In addition to the stiffeners, 5/16-in. transverse diaphragms were placed at approximately 22-ft intervals. Each diaphragm has a 10 by 20 in. elliptical lightening hole in its center. Also for interior support and stiffness, a series of 3/4-in.-diameter corner truss bars was provided. These bars were bent in a uniform zig-zag pattern. Their bend points, connecting both the web and flange plates, were welded at all of the contact points. This construction creates out of the bars and the main plate a set of inclined continuous trusses finding their support at the transverse diaphragm. The drawing of a half section at mid-span gives details, and the adjacent photograph pictures the construction.

Because of the zig-zag cross braces, the unbraced height of the web plates is reduced to the distance between the upper and lower longitudinal stiffeners. Longitudinal stiffeners are welded on each web plate along the line of junction with the inclined truss bars.

This trussing of the four interior corners of the box girder provides a novel feature. The net result is a very stiff and rigid girder, which also has



HALF SECTION at mid-span—same view as given by photograph at right



HOW GIRDER looks from the inside

the torsional rigidity that occurs from being braced along its longitudinal axis. The compression flange plate is adequately braced and stiffened during construction by the bar joist action created by the trussing bars.

Shear Connectors

Pairs of semicircular shear connectors made of flat bars 2 by ¼ in. are welded to the top plate. The bars are attached at a 30-deg angle and are spaced 3 ft 9 in. apart. One end of each connector is welded near the edge of the girder at a point directly above the web plate. The other end of the connector is welded above a contact point of a zig-zag interior truss bar. When placed in registry with the contact points of the zig-zag truss bars, the semicircular shear connectors immediately provide stiffening and bracing during the erection of the girders. They also serve the same purpose when the roadway slab is being poured.

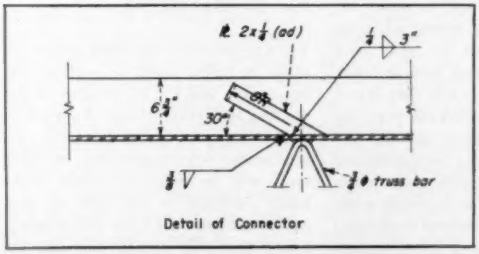
The top flange of the girder is held in close contact with the concrete slab by the shear connectors. As the slab gains strength, the flange is relieved of all but a minor increase in stress. Once the deck has been set, the upper ends of the truss bars may be regarded as fixed at the point where the shear connectors are attached. Since the slab deflection is negligible, the lower ends of the bars may be regarded as rigid and fixed where they are in contact with the web plates at the upper longitudinal stiffeners.

The roadway slab also acts to transfer the load from girder to girder, thereby eliminating the need for cross bracing between them. Its weight also gives stability to the bridge.

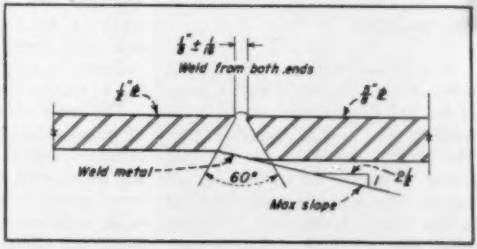
A ¼-in. intermittent weld 1½ in. long on 5-in. centers is used to connect the longitudinal stiffeners. The ¼-in. welds on the four corners of the box girder are continuous. The diaphragms are welded to the bottom plate with ¼-in. intermittent fillet welds 2-in. long on 12-in. centers. On the top flange and web plates, the space between welds is reduced to 6-in. centers.

In all, 732 lb of welding rod were consumed in the 530 hours required to build these two 110-ft box girders. Combined weight of the two girders was 80,180 lb.

When the welding had been completed in the Isaacson plant, the 20-ton girders were trucked some thirty miles to the bridge site. They were backed across a log detour bridge that closely paralleled the permanent bridge alignment. Each girder was skidded sidewise onto a false bent and then skidded into position on the bridge abutment. The anchor bolt connections completed the final erection of this unique structure.



HOW SHEAR CONNECTORS were welded to top plate



DETAILS of butt weld in ⅝-in. bottom flange plate

1—HAND CUTTING is one of the oldest applications of the oxyacetylene processes to maintenance problems

2—MACHINE CUTTING is also employed to considerable extent in maintenance work. Here's an example

Maintenance Welding in a

An accelerated defense program introduces factors that affect the four basic items entering into every maintenance problem: men, machines, materials and money.

BY JOHN H. REDMOND
Ass't. Manager, Production Dept., Koppers Co., Inc., Pittsburgh

WHETHER we are at peace, at war or in an accelerated defense program—that dream-world of the diplomats—we will always have maintenance problems. Fundamentally, they remain the same. What changes, though, in an accelerated defense program are certain factors that tend to affect the four basic items that always enter into our maintenance problems: namely, men, machines, materials and money.

Let's look at each of these items and see what can happen to it under emergency conditions.

No. 1—MEN

A problem that has already hit many of you is that of losing some of the key men of your maintenance welding crew to the Armed Forces. The draft, activation of National Guard units or the calling up of reserve officers and men can hit hard in this respect. Unless such losses are offset, they will tend to disrupt your organization.

It seems to me that we must accept the giving of these men when the call comes as a patriotic duty. It is a part of our fundamental belief as free peoples that each citizen has a responsibility to aid in the defense of our country when danger threatens. As free peoples, we have determined to have men in reserve, ready to answer the call in emergencies, rather than to have huge standing armies.

So regardless of how badly it may pinch, we must be ready to make sacrifices in our organizations and release men as they are called up. Those of us who remain on the job should also be willing to bear our share of the sacrifices. We must use our men who are apt to enter the service to the fullest extent while we still have them, but we also must endeavor to keep other men in training to replace them when they leave.

This means that a definite program of training oxyacetylene welding and cutting operators must be established and maintained. In addition, arrangements should be made to obtain some of the replacements needed from local vocational schools and other institutions conducting welding classes.

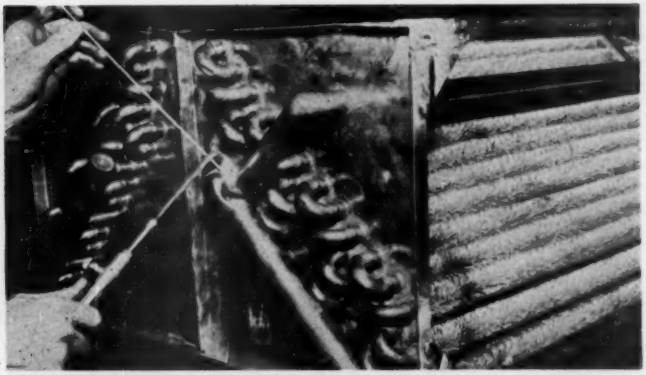
Naturally, a vacancy should be filled by promotion from within your ranks wherever possible. But this procedure still leaves an opening at the bottom. I would suggest that, in hiring new men, those of selective service age also be included, even if they can be used for only six months before being called. This will enable them to build a seniority record with you, at least.

When they return from the service, you will find that most of them are the type of men you want in your organizations. With their previously established seniority, you can re-employ them without complications. On the other hand, if you take the presently easier way and fill your vacancies at the bottom with the less desirable type of employee, you will regret it when the period of emergency is past.

No. 2—MACHINES

YOUR maintenance welding crews will often be called upon to perform the impossible and the miraculous in the months and years ahead. As production is stepped up, in line with the accelerated defense program, machine tools will be assigned quotas absolutely fantastic in the light of past performances. Schedules will be established that will greatly increase the wear and tear on all machines and

3—BRAZE WELDING makes quick repair of a cracked frame casting



4—SILVER BRAZING, employing low temperatures, has proved suitable to many types of jobs. Here leaky piping to a condenser is being brazed

Defense Program*

equipment. Breakages and breakdowns will be much more numerous.

Another factor contributing to breakdowns will be the comparative inexperience of the new employees hired to perform the expanded load of production work. For the most part, these people will be willing and enthusiastic but will lack the proper know-how and skill. This means that machines and equipment will be abused, and the resulting increase in wear and breakages will place a greater load on the maintenance welding crew to keep them operating at top speed.

One result of an accelerated defense program is that it confronts the maintenance welding crew with many problems that would not be put up to them at all in normal times. New or replacement parts are often unobtainable (at least within a reasonable time), due to the scarcity of materials and the oversold condition of the vendors that always accompany a period of emergency. It becomes necessary, therefore, to repair or reclaim by the oxyacetylene process many broken or worn parts that it might normally be more economical to scrap and replace with new.

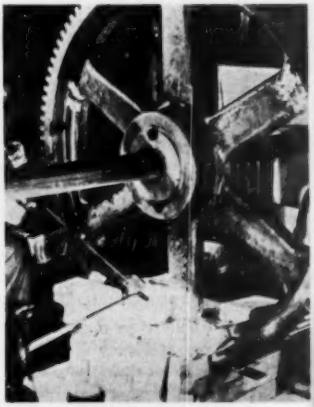
Then, too, situations may arise where the production of an entire plant is stopped because of the failure of an important element of an essential machine, say the frame of a punch or press. The best possible delivery dates for large castings of this nature during a period of emergency are usually many months ahead. Aside from the enormous losses for downtime, it is obviously essential to resume production at the earliest possible moment.

Here, again, the maintenance welding crew can step into the breach and reclaim the broken part so that production can be resumed in an unbelievably short time. Sometimes, where braze welding is recommended and localized preheating can be used, it may not even be necessary to remove the broken or cracked part from the machine, and repairs can be completed in a matter of hours. The savings, both in production and in money, can be phenomenal from an operation of this nature.

The oxyacetylene machines employed by maintenance welding crews are usually restricted to portable cutting machines. Such machines are ideal for cutting a great variety of replacement parts, or pieces for weldments to be substituted for broken castings.

Other oxyacetylene equipment used by the maintenance welding crew consists primarily of hand apparatus, including welding and cutting torches, regulators, hand trucks, portable

*Abstract of a paper given at the 1951 convention of the International Acetylene Association, Montreal, May 21, 1951.



5—CAST-IRON welding is still best method for some repair jobs

6—PIPE WELDING by gas torch is widely done for many purposes

7—GENERAL REPAIR welding on broken and worn parts and tools has to be done in every plant. Here a broken auger shank is being gas welded

8—HARD-FACING builds up worn parts and prolongs service life

manifolds and the like. One of the outstanding advantages of such oxyacetylene equipment is that it is light, portable and may be taken to the work, even when the latter is in quite inaccessible locations. This accounts, to a considerable degree, for the very wide use of the process.

No. 3—MATERIALS

THE PROBLEM of materials is inherent in an accelerated defense program and seemingly defies solution. Yet here again, I believe we must be constructive in our approach and recognize that there are workable substitutes for many of the so-called critical materials. We must also recognize that at least some of our dependence on materials in short supply in times of emergency is based on considerations other than proved performance on the job.

Once again, it is a question of function, of getting the job done, and any material that can fill the requirements is an acceptable substitute. It may well be that, by taking this attitude, each of us will come out of this period with an increased store of knowledge and experience that will save us time and money in the years ahead. Circumstances will have forced us to exercise our ingenuity and find substitutes for seemingly irreplaceable materials.

There is much we can do in making what critical materials we do get go further. A carefully prepared program designed to conserve the use of such materials should be put into effect and adhered to rigidly. Unskilled workers can waste much critical material in a comparatively short time unless they are closely supervised. Controls should be established to prevent wasteful practices.

Salvage procedures will pay for themselves in an accelerated defense program and will also put considerable quantities of critical materials back into the production cycle for re-use. It pays to charge some particular person with the definite responsibility of collecting, sorting and selling used materials and scrap. You can get more if such materials are first sorted and then sold as graded scrap, instead of being lumped together and sold as market scrap. As maintenance men, we will not be able to afford to throw critical materials and alloys needed for special jobs into the melting pot.

We should also institute suitable inspection procedures for incoming parts and supplies. Such items should be inspected before they go into the storeroom to make sure we have the proper material or item. Nothing is so exasperating during a breakdown repair as to pull a spare part out of stock and then find it is the wrong style or number and will not fit.

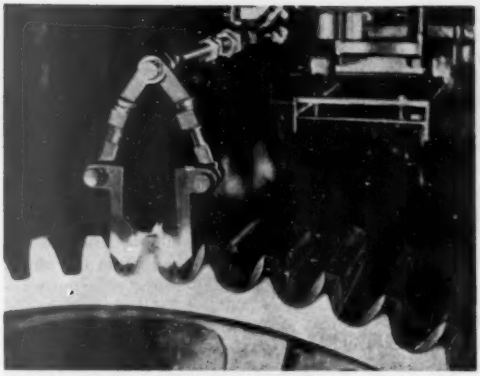
Longer operating weeks, longer deliveries on materials, parts and supplies, increasing shortages must be met by doing a constantly better job of planning on all phases of maintenance. If, for example, it is going to take six months to get materials, we will have to plan for our needs at least six months ahead of time. A good record system of the operating and maintenance history of each major item of equipment is an almost indispensable aid to this forward planning. Of equal importance are periodic inspections of equipment to determine its condition and enable suitable repairs to be made before breakdown occurs.

The foregoing remarks may be said to bear with special emphasis on materials used in connection with the oxyacetylene process, in particular where it is employed for maintenance work. Every effort should be made to see that adequate supplies of oxygen, acetylene, welding rods, fluxes, etc. are on hand at all times to handle any maintenance job that may come up without delay.

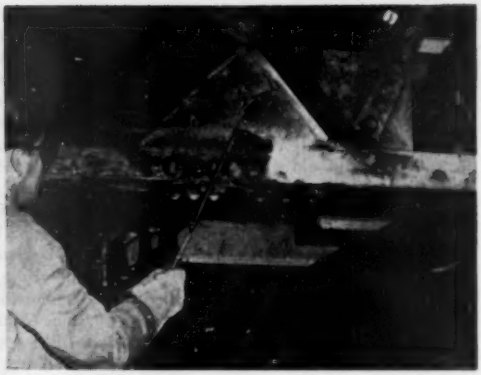
Empty cylinders should be returned promptly so that cylinder turnover may be increased and a sufficient supply of gases maintained with existing cylinders. Oxygen and acetylene pipe lines should be checked carefully for leaks, using soap suds. All leaks should be stopped, and the lines maintained tight. Welding rods should be stored carefully in a dry place so that they will be in good condition when needed. The same applies to fluxes and similar items.

No. 4—MONEY

YOU MAY wonder why I discuss money in connection with an accelerated defense program. It might appear that our only worry about money today is that it costs twice as much to do a job as it used to. However, there are two aspects of money that are closely related to maintenance. I would like to review them.



9—FLAME-HARDENING adds wear resistance to selected areas such as the teeth of this big spur gear



10—FLAME-CLEANING is done before repainting to remove scale, rust, old paint and dirt from steel

First, I would remind you that *deferring maintenance to a more convenient time is expensive.* Machines can be run 24 hours a day, 7 days a week for a certain period but not forever. Mandatory periods must be provided when maintenance men can inspect the machines and make adjustments and repairs to prevent partial or complete breakdown and keep the equipment in satisfactory operating condition.

It means more production for shipment to the fighting front and more money in your pocket to do this. It is to the best interest of our country to insure that our plants are kept in first-class mechanical condition. Let us not fool ourselves by keeping our machines running as long as they will run and deferring maintenance until it becomes "convenient."

Secondly, I would point out that deferring maintenance today means that you are taking money that should go into maintenance and throwing it into profit, which is taxed at a very high rate. It is just and fair that plants should be taxed during an accelerated defense program on any additional profits that result from expanding defense production. But it is unwise for any plant to jeopardize its future, inflate its profits and increase its taxes through failure to maintain its equipment in good operating condition.

Such a company is operating against its own interests and those of its stockholders. It is risking the future job-security of its employees. Worst of all, it is endangering its productive capacity and hence its ability to fulfill its prime obligation in the defense program.

Oxyacetylene equipment used for maintenance work should also be kept in first-class shape at all times. It is false economy to defer making necessary repairs to it. Since this equipment is essential for maintenance work on the plant as a whole, it is doubly important that it should not be allowed to deteriorate.

Ten Applications

THE VARIOUS applications of the oxyacetylene processes in plant maintenance are far too numerous to attempt to describe them all. Instead I shall mention briefly a few typical applications to illustrate the uses of the oxyacetylene flame in general plant maintenance work.

1. Hand Cutting: The general utility of the hand-cutting torch and cutting attachment in maintenance work is too well known to require further description. Figure 1 shows a cutting attachment being used to cut an oval-shaped plate that is needed on a repair job.

2. Machine Cutting: Machine cutting also is employed in maintenance work to a considerable extent. Machines of the type shown in Fig. 2 will cut either straight lines or circles in steel of almost any desired thickness. In this illustration, the machine is cutting a 3/8-in. plate to be used in fabricating a weldment to replace a broken casting.

3. Braze Welding: This, undoubtedly, is one of the most widely applied and money-saving processes used in maintenance work. Braze welding is unsurpassed for repairing broken and cracked parts and for building up and refacing worn parts. It avoids costly downtime by restoring machines to service promptly and makes large expenditures for new parts unnecessary. Figure 3 shows the braze welding of a cracked frame on a steam hammer; the job was done in a few hours with the frame in place (with only local preheating) at a small fraction of the cost of a new frame. Other examples are the building up of a worn mill engine piston by braze welding and the repair of a leak in a hot water heater coil. This last is a common operation in plant maintenance work.

4. Silver-Alloy Brazing: Silver-alloy brazing has proved highly suitable for repair work on both ferrous and non-ferrous materials. Relatively low temperatures are employed, but joints made by this process are strong and corrosion-resistant. Figure 4 shows the repair of a leak in the piping to a "water saver" (condenser) by this process. Because of the low heat employed and the absence of sparks, the operators seldom have to wear gloves, and are thus able to take full advantage of their manual dexterity.

5. Cast-Iron Welding: Cast-iron welding has been superseded by the more convenient and less hot braze welding to a major degree in maintenance work. However, there are still jobs for which cast-iron welding is best suited and where it is employed. One example is seen in Fig. 5, a gear for a large punch press. A broken

spoke in this gear was locally preheated in a furnace made of firebrick and then welded. Two rim cracks and one broken tooth were also welded.

6. Pipe Welding: Oxyacetylene pipe welding is widely used in plants in replacement of old pipe lines, in making changes in or extensions to existing pipe lines and in running new pipe lines. The operator in Fig. 6 is oxyacetylene welding a tie-in joint to a pipe line extension.

7. General Repair Welding: In addition to the several more or less specialized processes of oxyacetylene welding and brazing referred to, a plant will have much general repair welding to do on cracked and broken and worn parts of both ferrous and non-ferrous metals. Illustrative of this kind of activity is Fig. 7, which shows oxyacetylene welding being done on a broken shank on an auger.

8. Hard-Facing: Worn parts may be built up and their service life greatly prolonged over that of new parts by hard-facing. Naturally, hard-facing has a very important place in plant maintenance work. Fig. 8 illustrates the hard-facing of worn engine exhaust valve seats, using a rotating jig. These valves will outlast unfaced valves many times.

9. Flame-Hardening: By means of the flame-hardening process, selected areas of certain steel and cast-iron parts can be hardened to a desired depth to protect them from wear while the metal underneath the hardened layer remains soft and ductile. This process has proved of much value in plant maintenance work.

Machines with flame-hardened wearing parts retain their accuracy longer and require less frequent overhauls and repairs. This results in noteworthy increases in production efficiency and decreases in operating costs. The special tips shown in Fig. 9 are flame-hardening the teeth on a large spur gear. Note the depth and contour of hardened sections on teeth at right, coinciding with contact areas of maximum wear in service.

10. Flame-Cleaning: Flame-cleaning is used to remove scale, rust, old paint and dirt from structural steel before repainting. The oxyacetylene flame does a more thorough and durable job than any other method of reconditioning, usually at lower cost. Ordinarily, flame-cleaning can be done without disturbing normal operations of the plant since it generates very little dust or dirt and may be performed with a minimum of labor and light flexible equipment. The operator in Fig. 10 is flame-cleaning a riveted, gusseted roof truss joint. Note the scale, flaked paint and pitting that has accumulated in several years of neglect.

I would like to leave you with this final suggestion on maintenance:

As you repair, eliminate demonstrated weaknesses, if possible. This means analyzing each repair job to determine why it was necessary; and. if it was caused by a weakness, correcting that weakness when making the repair.

Courtesy The Lincoln Electric Co.

WELDING SAVED 85 TONS of steel on the 14-story Broadview Apartment building in Baltimore. As compared with 2,921,000 lb of steel used in the welded framework, 3,091,000 lb would have been required for riveted construction. Welding cost was approximately $30,000 under that of the riveting. Van Rensselaer P. Saxe, Baltimore engineer, designed the building. Vulcan Rail and Construction Co. did the fabricating and erecting

MAKING A SHIP GROW

(Continued from page 35)

all from Boilermaker's Local No. 374, AFL, did a good job, and there were no rejects. The American Bureau of Shipping made face and root bend tests from other samples cut from welded joints. All passed with flying colors. Some 30 weldors were at work most of the time in two shifts. They used 20 d-c motor-driven welders of 300 and 400 amp rating.

AWS E-6010 electrodes were used for welding on the ship, both on mild and on manganese steel. For vertical up welding on the shell sides, 3/16-in. diameter electrodes were used, except for the root pass, for which 5/32-in. electrodes were used.

Reinforcing Straps

To strengthen the ship after the midsection was added, long reinforcing straps were welded to both the shell and the deck extending from the deck house aft to the forward house forward. Shell strap plates were 1 3/16 in. thick, 23 to 30 ft long and about 37 in. wide. Deck strap plates were 1¾ in. thick and of similar length and width. Over the original riveted butts, welded inserts of 1¾-in. plates were installed. These inserts were welded with either ¼-in. electrodes (8 hours for a 30-in. weld) or with 5/16-in. electrodes (6 hours). The two work edges were beveled so that the included angle was 45 deg. Welding was finished in just a few days over three months from the start of the job.

Once more welding and flame-cutting has speeded a vitally important task. Weight was saved because of the elimination of angle plates, lap joints and other structural details needed in riveting. The owners saved considerable money and increased the cargo capacity. Had the ship been all-welded in the first place, the job could have been done even faster and easier, according to Mr. Crawford the yard foreman.

The writer is grateful to J. N. Macomb, Jr., of Inland Steel, and to the following American Shipbuilding men for their gracious coöperation in furnishing information: Bruce Crawford, J. M. Dalzell, Stanley Midnight, Alex Dalrymple and Frank Talbot.

A WELDOR'S WOES

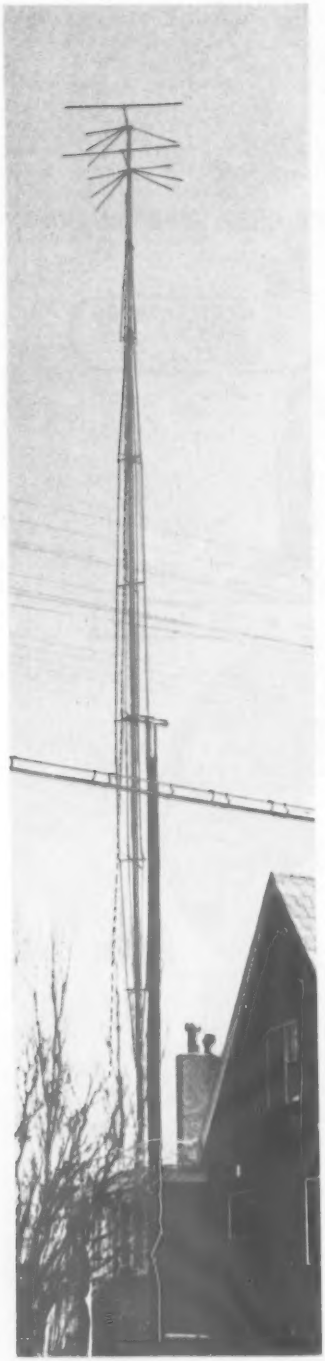
BY FRANK TABOR

YOU SWEAT BLOOD GETTING A JOB OUT ON TIME --- THEN--
WATCH THE OFFICE CREW TAKE THE BOWS!
THERE SHE IS! RIGHT ON TIME!
JUST WHAT I WANTED! YOU BOYS REALLY WORK FAST!
WORK LATE TO FINISH A JOB AND---
EMPTY
POP!
5 MINUTES TO GO ON A BRAZE JOB AND - BOING! --- NO ACETYLENE!
SPOT THIS!
WELD THIS!
STICK THIS!
TACK THIS!
WHEN YOU MAKE A SMOOTH WELD, THE BOSS SEZ---
THAT'S SURE GOOD ROD!
BUT LET THE WELD BE A LITTLE ROUGH---
WHERE DID YOU LEARN TO WELD?!
FRANK TABOR

A Rotating Mast for Television

One person can lower the aerial from 75 to 80 feet to the ground in a few seconds with these welded tubular masts, made to stand a storm without guy wires.

BY JANICE TURNER



TALLEST MAST Troth ever made—it stands 95 ft. Mast is pivoted to top of wood pole for rotation

LIKE THOUSANDS of other small towns over the U.S., Orleans, Ind., is well outside the local transmitting range of a television station, and its televiewers must erect tall aerial masts at least 60 ft high. Many of these are the conventional straight-shaft type or the aluminum triangular type, which must be supported by guy-wires in every direction. Rapidly gaining favor, however, is an all-welded mast designed by a local man, Lowell Troth.

Troth's masts are made to withstand the torsion stresses of a storm without guy wires. What's more, one person can lower the aerial to the ground in a few seconds. That's a big advantage when repairs have to be made on the aerial itself or on one of the lead-in wires that transmit TV waves from the aerial to the screen.

Top Becomes Bottom

Troth's design embodies a rigid mast, which when necessary rotates on a shaft so that its top becomes its bottom. The rotation is made possible by mounting the mast on a secondary supporting structure—in this case, a wooden pole half as high as the mast itself. Fitting into a bearing sleeve at the top of the pole is a horizontal kingpin. The kingpin also fits into a sleeve at the hub or center of the steel mast. On this pivot, the entire mast can be swung leisurely around in the manner of an enormous two-bladed airplane propeller.

When trouble occurs at the top, the TV owner attaches a light rope and unlocks the padlock that holds the mast secure at the base of the supporting pole. Holding the rope, he lets the slightly top-heavy mast swing down until the aerial is at the ground. Repairs are then easily made. When the trouble is righted, he pulls the rope to swing the mast again and raise the aerial. When it's once more where it belongs, he relocks the padlock so that small boys or other unauthorized persons won't be tampering.

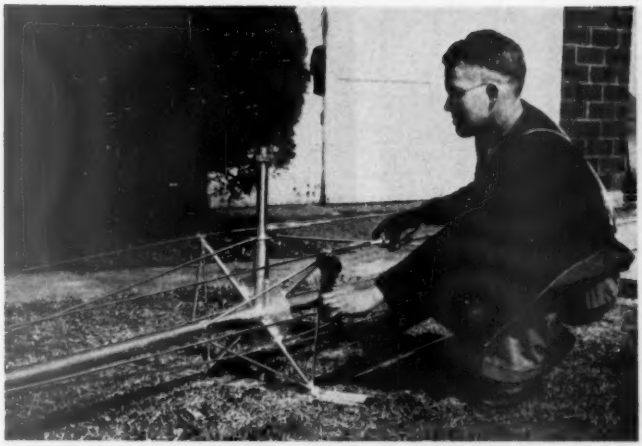
The pole on which the mast is mounted is simply a creosoted wood pole of the type used for rural electric lines. A steel casting with a flat cap plate slips down over the top of the pole, and the bearing sleeve for the kingpin is welded to the cap plate.

From Apples to Welding

Troth, a boyish-looking grandfather, works alone in a neat red-brick shop just north of town. He wasn't always a weldor. Out of high school at the close of the first World War, he did a three-month stint in the army, then went to the New York Electrical School in New York City. Later he studied two years at the Milwaukee School of Engineering. When he came home, he found he was needed in the family apple-growing business. However, when the orchard business died what he considered a timely death in the depression, he found it easy to make welding and machining a full-time occupation.

He built his first mast three years ago when he was approached by Orleans' first television enthusiast. This early televiewer was worried about possible breakdowns at the top and wanted a mast that would rotate on a secondary shaft so he could lower it to the ground without effort.

Weldor Troth undertook the job. His first effort, which he does not recommend, was a 70-ft mast strengthened by fiddle braces at intervals of 120 deg and with an effective depth or radius of only three inches. The owner had also asked for the motor changing the direction of the aerial to



HUB OF MAST has a bearing sleeve to fit over a kingpin. The kingpin, a vertical rod in picture, will be horizontal when mast is joined to pole

be placed at the bottom of the mast. He thought that a ⅜-in. rod running up through the steel-pipe mast could be hooked up to the motor and would turn the aerial by means of a brass bearing at the top. However, the torsion of the ⅜-in. rod was too great for efficiency.

In spite of these design defects, the initial mast attracted other new television owners. Gradually, Troth worked out a mast that he now believes is windproof, stormproof and likewise foolproof.

Braces Stand Foursquare

The mast is now braced by four fiddle braces spaced at 90-deg intervals instead of by the original three. The effective depth of these braces at the axis hub (where the mast fits onto the pole) is 10½ in. Greatest stress, Troth explains, is placed upon the mast when it is raised or lowered: when the mast reaches a horizontal position the strain on the center reaches a maximum since it must then bear the weight of both ends. If the fiddle braces were spaced 120 deg apart, only one brace would be available to withstand the strain of the horizontal position, the other two being slack. With four braces set in a square, two are always available in case of stress.

The shaft itself is made of telescoping steel pipes ¾ in., 1 in. and 1¼ in. The heaviest pipe is reserved for the center. Five groups of horizontal struts, including those at the hub, join the fiddle braces to the shaft. All of these joints are welded.

The main fiddle braces are supplemented by ten others. Four of these are what Weldor Troth calls "subfiddles," and they project 5 ft in either direction from the hub. These distribute the stress over a greater area and so provide further insurance against a center break.

The other six braces grew out of Troth's realization that the several feet of mast that extend beyond the main fiddle braces would be subject to wind stress at the upper end because of the wind-drag of the aerial itself and to weight strain at the lower end when the mast is raised or lowered. To meet these conditions, he added four fiddle braces at the upper end and two at the lower. The upper braces must protect the top from wind stress from any direction, but the two at the ground end are placed 180 deg apart because they have to withstand strain from only two directions.

How a Mast Goes up

An important safety feature is the copper lug welded onto the steel sleeve at the top of the supporting pole; to this lug is attached the lightning conductor. The grounding wire that makes the mast safe from lightning runs down the supporting pole and forms at its base a pancake coil that is always embedded in moist earth.

Mounting these masts on their supporting poles is a ticklish business. Troth says that he has unbounded admiration for the crew of Rural Electrification Maintenance Corporation men who thus spend their Saturday afternoons. In addition to buying a Troth-built mast, the Orleans televiewer has to buy a 40-ft creosoted light pole from the REMC. While two of the five-man line crew are digging a 5-ft-deep posthole for the pole, the others ready the mast for erection. With the help of the REMC derrick truck, the pole is set, after which the mast is lifted to within a foot (the derrick can lift it no higher) of its destined position. One of the crewmen, hanging onto the pole by the grace of the spikes in his shoes, has to lift the entire mast for the remaining foot and jam the hub shaft into place.

"And these masts are heavy," comments Troth. In addition to the steel pipe, the fiddle braces and the struts require 180 ft of ¼-in rod. You can guess at the weight yourself. The tallest mast that Troth has ever made is 95 ft.

Troth's aerial masts cost more than their factory-made competitors, which average about $1 per foot. His labor alone amounts to $82; materials add another $55. "The cost scares a lot of people," Troth admits. "But don't forget that with the conventional-type mast trouble at the top will cost you around $40 just to get your mast down and back up again."

Customers Bring Materials

To meet the current materials shortage, Troth has made it a requisite that a man wanting a mast bring the materials to him. Often a customer must drive all around the countryside to locate exactly what he needs. It wouldn't be fair to the customer, Troth reasons, to charge him the customary hourly rate for driving around on a scavenger hunt for a certain size of turnbuckle, say.

Troth welcomes all the difficult, tricky jobs that come his way. But he believes in working them out on paper before he starts to weld. "A man should do it right," he says, "and take plenty of time for the figuring. The job shop weldor's knowledge of stresses and strains should be as much a part of the service he offers as his welding electrodes."

1—SPOT WELDING is done to make such parts as fenders and dust covers for track frames. Cups on legs of skid facilitate stacking

2—ARC WELDING: jig can be rotated in any direction to position the welds

Welding Practices at

Mass production methods for arc-welded parts of farm implements were carefully studied in this western Washington plant. Each job has its own welding fixture.

BY HOWARD E. JACKSON

JOHN DEERE & Co., of Moline, Ill., is the world's second largest producer of farm implements, having 16 big factories scattered throughout the United States. The branch in Yakima, Wash., exists primarily to serve the specialized agricultural needs of the Pacific northwest. Its welding practices are based upon those in the home office plant at Moline, with its own special techniques superimposed.

Parts to be welded at Yakima run the gamut of farm implements—parts for tractors, tool carriers, disc harrows, subsoilers, transplanters, etc. Some 3,000 tracks for crawler tractors and some 4,500 disc harrows, plus hundreds of repair parts, are made annually. The parts may range in weight from a few pounds to 1,000 lb. The material is mostly hot-rolled steel, from 3/16 in. to 1 in. thick.

Movement of material in the rear door to storage and out the side door to welding had to be worked out simply, and welding techniques had to be efficiently engineered. Most production welding takes place at one end of the forge shop, directly adjacent to the punch press, brake-and-shearing and heat-treat sections.

The parts that have been forged, formed (punched, pierced, etc.) and/or heat treated are brought by lift truck or hand truck to the welding storage area, located behind the welding section of the forge shop. The parts are taken out a side door, between the welding and the punch press sections. They are stacked compactly on pallets, on special platforms or in special metal tote bins. The platform and tote bins are made with cuplike fixtures on top of the legs (see Fig. 1) so that they can be stacked safely eight or ten platforms high. Legs of platforms and tote bins are identical so that both kinds of material-handling equipment can be stacked in the same pile.

When the weldor is given a shop order and drawing to weld a certain part of assembly, he first goes to the storage area and picks out the necessary jig or fixture. There is a jig or fixture for each of the many welding jobs (Fig. 2). These are all made in the company's own tool and die room.

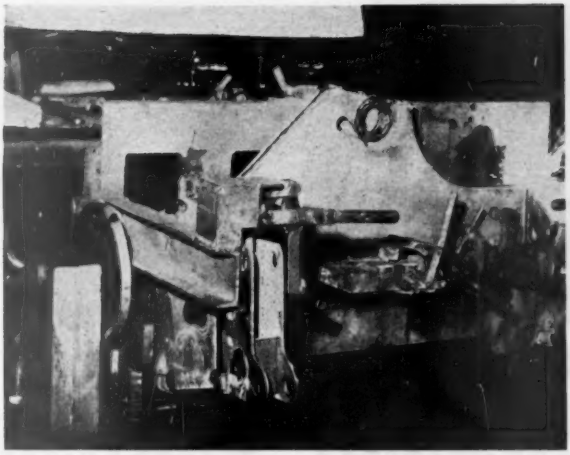
If the parts to be welded are in separate piles so that the weldor can carry in what he needs, he does so; if they are on large tote bins or on pallet boxes, he gets the lift truck to move them into the welding section to his particular booth.

All of this is considered as set-up time and is charged to a set-up time account number. After the weldor has arranged the booth, he punches in on a production time card.

WELDING EQUIPMENT

A dozen 300-amp welders, both a-c and d-c, are used in the weld shop. In addition, Plant Maintenance has its own portable welder and oxyacetylene outfit and the machine shop has its own spot welder (Fig. 1), which is used to weld sheet metal for fenders, dust covers for track frames, etc.

Let's go back to the weldor in the main welding shop. As part of his set-up time, he arranges the parts in an assembly fixture specially designed with locators and clamps (Fig. 3). Many of the fixtures rotate so that the



3—EACH JOB requires its own fixture, with special locating stops and clamps. The fixtures are made in the company tool room

4—PART GOES from welding to cleaning area for pneumatic chipping to remove slag

John Deere Yakima Works

work can readily be positioned for downhand welding. Rotation requires only one hand—or a foot—so the weldor seldom has to lay aside his electrode holder until it's time to make the next set-up.

The welding machine is adjusted to run at the highest current possible without sacrifice of weld quality. To get the right current setting, hand ammeters are deemed more accurate than the welding machine dial. The portable ammeter is clipped on the lead cable behind the welder, and a reading is taken from it to see that the amperage recommended by the electrode manufacturer is being faithfully followed.

The trend has been to large electrodes and welds of deep penetration at Yakima. Straight polarity is used for flat and horizontal welding; reverse polarity occasionally for difficult positions or on welds of especially deep penetration. Only mild-steel electrodes are used. On work of medium-carbon steel, the weldor employs low-hydrogen electrodes and makes but one pass. If the same work were done with a straight-polarity electrode, multiple passes would be required to obtain good welds.

Special techniques have been worked out for the welding of heat-treated parts to mild steel. Again, a low-hydrogen electrode is used, but with a low heat setting. One example is the welding of a clip onto the case-hardened sway pin for the tool carrier. Another is a flame-hardened high-carbon steel part welded in the arm attachment assembly for the tractor tool bar.

The weldors avoid preheating by use of the low-hydrogen electrode. The welding sequence is worked out to normalize distortion and buckling. Very little edge preparation is needed; assemblies are designed so that the fit-up for welding eliminates the requirement for scarfed edges.

Chipping and Finishing

After the weldor has finished a part, he puts it in a tray at the entrance of his booth, to be moved by hand cart or lift truck to the cleaning area. Slag is removed by pneumatic chippers (Fig. 4). Some work is gone over with a disc sander to polish the piece and get it ready for additional assembly.

The usual ways of estimating welding time are not always used here, although such estimates have been made. The time standards department has developed data on deposition time, and its records are available for estimates. The welding foreman keeps schedules on all jobs. Knowing the amount of work that can be turned out in so many hours, and how many assemblies can be done in a certain period, he can readily determine how many man-hours would be required for any project. In this way, the finger can be put on the manpower situation . . . and there won't be any idle men hanging around on any job or project.

Weld samples are turned over to the metallurgical laboratory for structural examination. Each specimen is polished through four stages with emery paper until a high polish is obtained. A 15% Nital solution is poured over the specimen and allowed to sit 10 seconds; then the specimen is flooded with hot water and blown dry. It is then examined for penetration, undercutting, too much heat, etc. Break tests are also made to tell by fracture what has taken place. The metallurgical department makes recommendations, on the basis of its examinations, as to what electrodes should be selected and what techniques followed in future welding.

9,000-BARREL oil barge used in "Operation Mount Vernon" has eight cargo compartments and two rake ends

DELIVERY TRUCK brought five tons of liquid carbon dioxide to "inert" the cargo compartments for welding

Inerting Oil Tankers

As used here, the term "inerting" has nothing to do with inert-arc welding. It means the use of carbon dioxide to prevent a fire or an explosion while a vessel transporting petroleum products undergoes a welded repair.

BY WILL COOPER
Marine Engineer, Cardox Corp.

THE ABILITY of carbon dioxide to inert explosive atmospheres and inhibit explosions of petroleum vapors in empty tanks, tankers and tank barges was assumed long before it was tried. That the assumption was justified was later confirmed by research carried on by the U. S. Bureau of Mines. In 1942 this method received official recognition when the Navy Yard at Mare Island, Calif., issued an operating and safety manual for doing welding on "foul" compartments that had been "inerted" with CO_2 gas but not "gas-freed."

(It is assumed that the terms "inerted" and "gas-freed" are self-explanatory. They are used as interpreted in the American Bureau of Shipping regulations of December, 1949, Section No. 2 covering "Standard Definitions.")

Probably because low-pressure bulk storage and transportation of CO_2 was not generally known ten years ago, when the only method of storing the gas was in high-pressure steel cylinders, nothing seems to have been done with CO_2 for inerting purposes in commercial shipyards until 1943. In that year a rather unfortunate experiment was conducted.

J. S. Brodie, at that time superintendent of operations for the Federal Barge Lines, was irked by the time consumed in steam cleaning oil barges for minor repairs. He suggested the use of CO_2 for inerting. Through his efforts, an oil barge was inerted at New Orleans on Sept. 28, 1943, with dry ice as the gas source. In his official report of the demonstration, Lt. (S.G.) Ray Cox of the Technical Section of the U. S. Coast Guard, states that the barge was rendered "entirely non-explosive, but gas-freeing by this method is opposed by all interested parties except the operators."

The objections were not stated in Lt. Cox's report. A letter written to the Coast Guard by a certified chemist who unofficially witnessed the demonstration intimates that it was the source of the gas (dry ice) that discredited the process. From our knowledge of dry ice characteristics, we think we would agree.

Be the reasons what they were, the process *was* discredited and nothing more was done about it until a representative of the Cardox Corp. happened to call upon S. G. Elliott, vice-president of the Standard Oil Co. of Ohio, in 1945. Mr. Elliott commented on the time delays in gas-freeing oil tankers and barges and asked if Cardox, with its patented low-pressure transport and storage units, couldn't develop something to help.

"Operation Mt. Vernon"

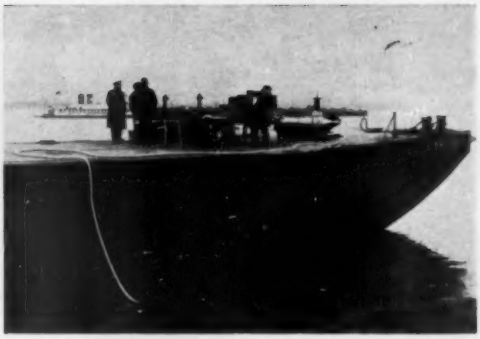
This conversation initiated what came to be known as "Operation Mt. Vernon." Mr. Elliott assigned the duty of working out a joint research project with the Cardox Corp. to E. F. Morrill, at that time superintendent of river and pipe line operations for the Sohio Co.

To make a long story short, Mr. Morrill undertook to furnish a barge, while Cardox agreed to supply the gas, furnish the technical help and secure the attendance of the desired witnesses. A truck with five tons of liquid carbon dioxide was dispatched from the Cardox gas plant at Monee, Ill., for the purpose of inerting an oil barge at Mt. Vernon, Ind., on the banks of the Ohio River on November 29-30, 1945.

The schematic drawing shows how the CO_2 was applied.

Those who witnessed the demonstration on the behalf of the Coast Guard were: Commodore Norman Hall, chief of Bureau of Marine Inspection, Washington, D.C.; Lieut. R. A. Jennings, representing Technical & Research Bureau, Washington,

HEAT EXCHANGER or vaporizer. One pound of steam at 10 psi will vaporize 8 lb of liquid carbon dioxide



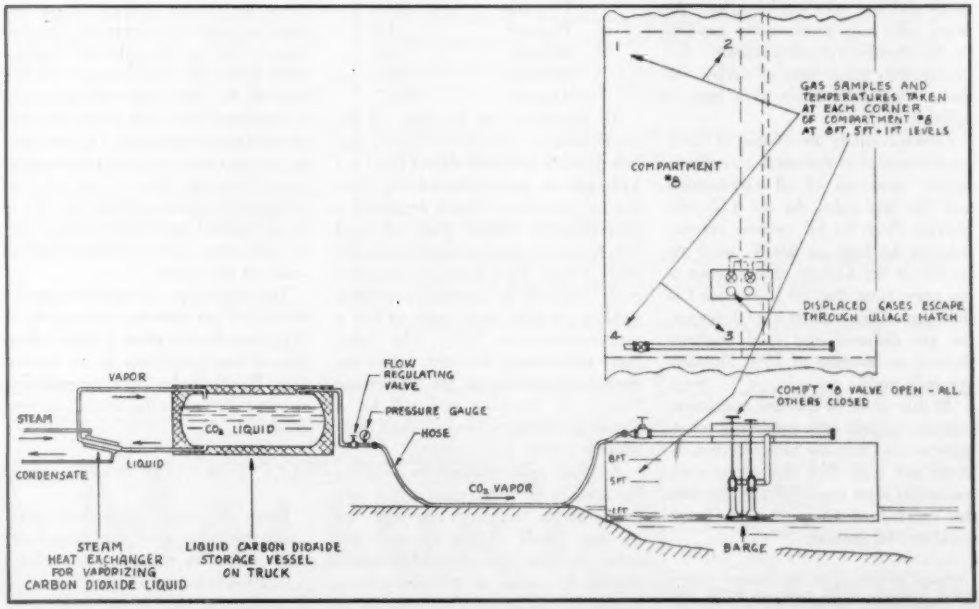
HOSE LINE conducts the vaporized carbon dioxide from storage tank on truck to the deck of the barge

for Safe Welding*

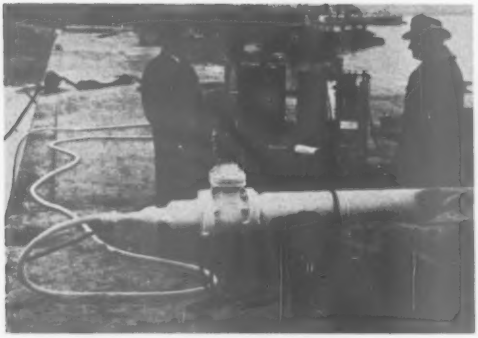
D.C.; Lieut. Commander A. W. Medcalf, inspector B.M.I. & N., Louisville, Ky.; Lieut. M. S. Fila, representing supervising inspector B.M.I. & N., St. Louis.

As a result of this successful demonstration, a technical report was prepared and presented to the Marine Council of the Coast Guard with a request for formal approval of CO_2 inerting. The Marine Council decided that its only concern was that a "safe for fire" certificate be issued by a certified chemist before hot work was started on a tank vessel, and it was not concerned with how the chemist secured the safe condition. The matter was accordingly referred to the American Bureau of Shipping, which certifies the marine chemists. The Gas Safety Committee of the ABS drew up a code of regulations for the process of gas-freeing and/or inerting. This was formally adopted by the National Fire Protection Association in October, 1946. From that date on, certified chemists were authorized to

*Abstract of a paper presented at the March 22, 1951, meeting of the New York Metropolitan Section of The Society of Naval Architects and Marine Engineers.



SCHEMATIC of inerting set-up shows how the liquid carbon dioxide is vaporized and returned to the storage tank



VAPOR supply hose connected to 8-in. header on the barge. Note the Orsat analyzing apparatus on the table

GAS SAMPLING tubes entering the ullage (unfilled space) of compartment No. 8. Readings are taken here

issue "safe for fire" certificates for vessels inerted according to regulations with CO_2 gas. The original regulations have been revised; the latest edition, issued in Dec., 1949, considerably enlarges the scope of "hot work" permitted on inerted vessels.

So much for the historical phase. Now for some factual data.

The barge used in the initial demonstration was Sohio No. W918. This barge has eight cargo compartments totalling 53,200 cu ft and a total oil capacity of approximately 9,000 bbl. It also has rake compartments at the stern and bow ends. All of the cargo tanks and one rake were inerted; the other rake was pronounced gas-free by the chemist without treatment. Approximately three tons of carbon dioxide were introduced at a rate of 1,560 lb per hr.

Concentrations in excess of 50% were obtained at the vents and ullage-hatch† openings of all cargo tanks and the one rake. As the CO_2 was heavier than the oil vapors, concentrations as high as 100% were recorded at the bottom of the tanks at the same time that 50% was read at the vents. After a short time, however, the gas diffused and final readings showed an average of 75% throughout each tank.

At this point in the demonstration, tests were made with welding torches, matches and flaming hemp to demonstrate not only that the cargo compartments were non-explosive but that the residue of cargo in the barge could not be ignited.

†Ullage is defined as the amount that a vessel bearing liquid lacks of being full. An ullage-hatch, therefore leads to the upper or ordinarily empty part of the compartment.—Editor.

One pertinent question is: "How does one know how much carbon dioxide is required?" The United States Bureau of Mines has issued a table giving the required concentrations of CO_2 necessary to inert safely against a number of the more common gases. The following list of CO_2 percentages was compiled from the U. S. Bureau of Mines data:

With	Hydrogen	71.9%
"	Carbon Monoxide	71.9
"	Ethylene	44.3
"	Ethane	36.2
"	Methyl Alcohol	35.7
"	Propylene	32.9
"	Propane	31.9
"	Pentane	31.4
"	Hexane	31.0
"	Methane	30.5
"	Acetone	25.7

To illustrate the meaning of the above table, a mixture of 71.9% carbon dioxide and the balance (28.1%) hydrogen is non-explosive. As there are no petroleum vapors requiring a concentration higher than 32% of CO_2 to render them non-explosive, the Mare Island Navy Yard, in its previously referred to manual, permitted welding on fuel tanks with as low a concentration as 38%. The latest Navy regulations, however, follow the recommendations of the American Bureau of Shipping and call for a concentration of never less than 50% while hot work is in progress.

A quick rule-of-thumb to calculate the amount of CO_2 required for any job involving petroleum products: apply one pound of gas for each ten cubic feet of space. This value is slightly in excess of the amount required but is an easy proportion to remember and calculate. Morover, it will allow a good margin of safety. A more accurate formula to determine the minimum amount of CO_2 required to meet the American Bureau's requirements of concentration in a given space is $W = \frac{1}{2}V \div 8.4$, where

W = weight of CO_2 in lb
V = volume of space in cu ft
8.4 = specific volume of 1 lb of liquid CO_2 expanded to vapor at atmospheric pressure at average ambient temperature

The above formula assumes efficient application and no loss of CO_2.

The simplest and safest way to tell when the proper amount of gas has been injected is to measure the volume of CO_2 gas in a solution of potassium hydroxide and measure the volume of the remaining atmosphere in a graduated tube. This is the principle of the Orsat apparatus. The best way to use the Orsat is to test the escaping gases from the tank at the vent or ullage-hatch opening while the CO_2 is being applied and stop the injection of gas when 50% concentration is noted at that point.

The usual type of explosive-gas detector will not measure the amount of CO_2; therefore it gives a false indication of the conditions in an inerted tank. It will always show an explosive atmosphere unless the vessel has been gas-freed.

Dangers of Static

There is much misapprehension about the dangers of explosion from static electricity when inerting. Static generation is built up through friction of solids and liquids and not gases. However, the discharge of CO_2 from a

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Welding Materials

high-pressure cylinder, supercooled when it expands at the orifice, will form particles of dry ice. These will build up a static charge, which will develop a spark unless the cylinder is grounded to the vessel. It may develop a spark even then if the discharge is made through a rubber hose or a plastic nozzle.

The recommended way to inject carbon dioxide is through the cargo lines. This will effectively inhibit any static. If it is not practicable to introduce the gas through the cargo lines, however, then use a flexible metal hose. The ideal conductor is a rubber hose reinforced with woven metal, which is connected to the couplings at each end so that a continuous metallic circuit is established from the CO_2 tank to the metal diffuser at the end.

All of these precautions are unnecessary if CO_2 from a low-pressure storage tank is being used through a vaporizer to inert the vessel because then there is neither liquid CO_2 nor dry ice particles. The vapor alone can no more cause a static spark than the air draft from a ventilating fan.

This digression on static is necessary because it can be a trouble maker if proper methods are not used.

Stratification

Put in at the bottom, carbon dioxide will stratify and displace the explosive vapors, floating them out exactly as water would float out oil. Hence the chemist has only to sample the discharged gases at the vents to know when the required concentration has been reached throughout the tank. A 50% concentration of carbon dioxide at the high point indicates that the entire tank is inert against explosion.

To avoid waste, don't inject the carbon dioxide too fast. The turbulence created by too rapid flow will cause the CO_2 to mix with the explosive vapors and be expelled with them. That is another reason why the use of the cargo piping is desirable. The large diameter permits a large flow at low velocity, thus avoiding gas waste.

In the previously described "Operation Mt. Vernon," for the first 21 minutes of CO_2 application to the cargo spaces there was no evidence of CO_2 in the escaping gases. The concentration then built up rapidly and had reached 60% within the next 8 minutes, at which time the gas was shut off. A subsequent test after diffusion had taken place showed an average concentration of 92.5% of CO_2 throughout the compartment.

The behavior of the gas in the rake end was strikingly different. There was no cargo piping in the rake compartment, so the gas was injected through a 1-in. hose let down to the bottom of the rake through the manhole. Due to the small size of the hose, the velocity of the gas as it entered was high; turbulence was created, and there was no stratification. The instrument men checking at the manhole reported CO_2 in the escaping gases almost immediately. The percentage increased while the gas continued to flow. When it had reached 50%, the flow was shut off. Instead of a high concentration of 90% or more at the bottom, as with the other tanks, there was a uniform concentration of only 50% throughout the tank. The concentration did not increase above 50% although the amount of gas injected had been sufficient to bring it up to the same figure as in the other tanks. The gas had been wasted because turbulence had mixed it with the expelled vapors.

From the foregoing, it might appear that a serious disadvantage of stratification is the chance of pockets of explosive gas being isolated: between stiffening members under deck plates, for example, and/or among intercostals and longitudinals in double bottoms. This is not, however, a hazard that needs to be regarded. A little understood law of natural science called "Diffusion of Gases" says that gases mix. Even gases with extreme differences in densities do not remain separated like oil and water. The mixing begins as soon as the gases come into contact and continues until the mixture is uniform. Even if there is an explosive gas pocket and it is ignited, there will be no serious consequences. With most of the space filled with CO_2, there is so much inerted area to act as a cushion that it will absorb any shock of detonation. This has been demonstrated by laboratory tests.

As for safety, CO_2 inerting is the most certain method there is for rendering a foul tanker explosionproof. There simply can't be an explosion if the proper concentration of gas is maintained. This is not true of a vessel gas-freed in the conventional manner, especially if it is an old vessel with any scale or has riveted joints. The fact that the vessel has been gas-freed and is covered by a chemist's certificate to that effect frequently leads to a false sense of security. The workmen neglect to have conditions checked to see that the vessel stays gas-free; it regenerates flammable vapors, and a disastrous explosion results. There have been many instances.

Low-Pressure Storage Tanks

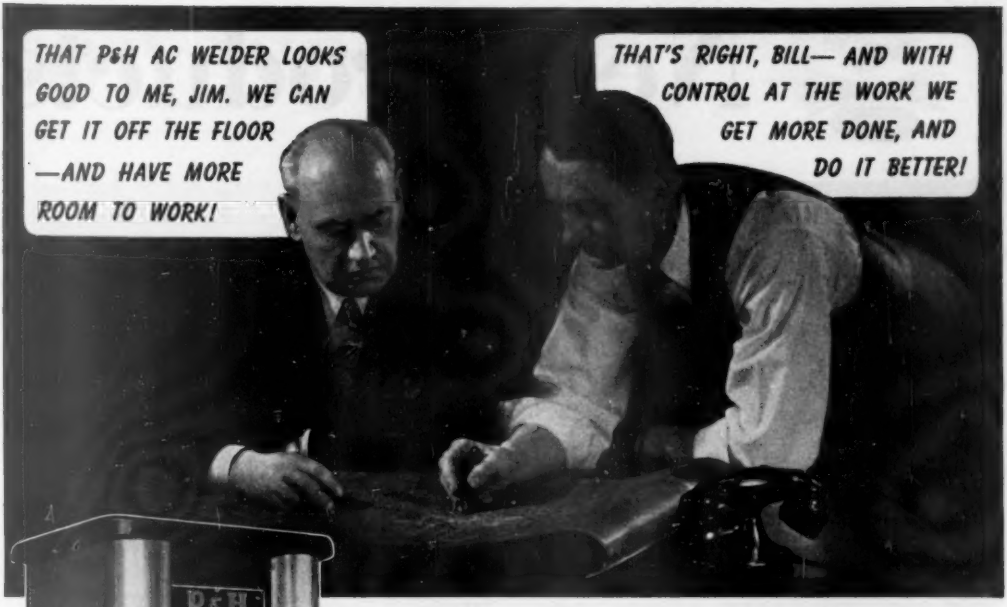
To do a successful job of inerting for safe welding, the essential thing is a large supply of available CO_2, which can be applied at a uniform rate, rapidly but without creating turbulence. The only practicable way of meeting this requirement is with the low-pressure storage tank. The principle under which these tanks are constructed is that of the relation of the boiling temperature of a liquid to its pressure. In the case of CO_2, the most economical balance (considering the weight of the steel necessary to confine it and other factors involved) has been found to be at a temperature of zero F and a pressure of 300 psi. These storage units are constructed according to the ASME code for unfired pressure vessels to operate at a working pressure of 325 psi. A refrigerating unit maintains the proper temperature and concurrently controls the pressure; it is self-contained and automatic like the domestic refrigerator.

Low-pressure storage units were first built in 1936, and the problems incident to their fabrication and use have been well worked out. These tanks may be built in any size to meet job conditions. Tanks with a capacity of 125 tons of liquid CO_2 have been constructed and are in use today. Tank trucks for highway use and tank cars for railway delivery of CO_2 have been constructed according to the same theory and are in everyday use.

Even though you own a low-pressure storage tank, to do an economical inerting job is not quite as simple as running a hose from the tank to the vessel and opening a valve. The gas is in the tank as a liquid and it is wanted in the space to be inerted as a vapor.

Conversion of the liquid to a vapor is a heat-consuming operation. Unless some equipment is furnished for sup-

(Continued on page 104)


THAT P&H AC WELDER LOOKS GOOD TO ME, JIM. WE CAN GET IT OFF THE FLOOR —AND HAVE MORE ROOM TO WORK!
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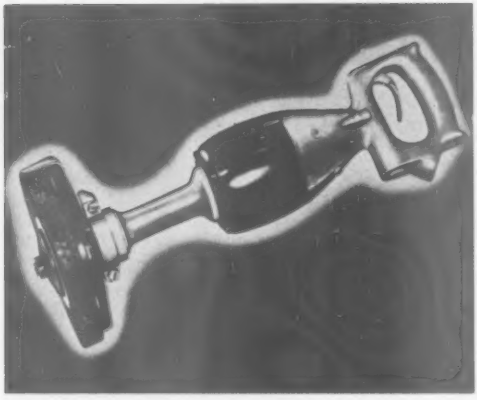

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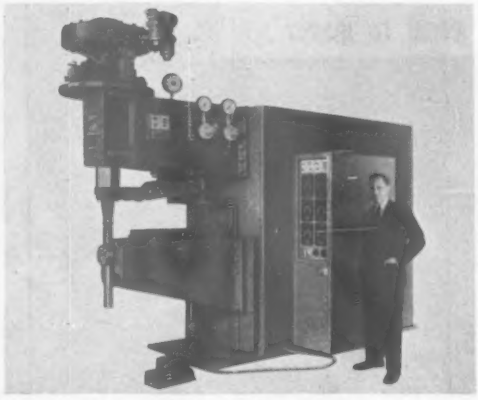


TWO ¼ IN. SHEETS of aluminum can be spot welded at 225,000 amp in this big new Sciaky "Three-Phase" welder

Overspeed Safety Coupling on New Air-Powered Grinder

SEVERAL practical new features recommend the new Ingersoll-Rand air grinder, according to the company. First, the grinder contains a motor governor plus a built-in "overspeed safety coupling" that automatically uncouples the arbor and grinding wheel if dirty air, abuse, maladjustment, etc., cause the motor to overspeed.

Another safety feature is a multiple exhaust system, allowing the operator to choose any one of four exhaust positions, spaced 90-deg apart to direct it away from the work and his body. In addition, special muffling keeps the grinder much quieter than comparable makes, says Ingersoll-Rand.

A safe-carrying grip type handle has enough space between the throttle lever and the back of the handle for a comfortable hand hold. This permits it to be carried safely while connected to an air line.

A new rubber-faced throttle valve is unaffected by oil or moisture and seats better, says the company, than beveled faced steel valves. New design in the motor produces 20% more power with lighter weight, it is said. An independently mounted arbor with widely spaced, permanently lubricated arbor bearings results in longer grinder life.

The grinder is available for 5, 6 and 8-in. wheels, running at respective motor speeds of 4,500, 4,100 and 2,100 rpm. Overall length is 24⅝ in. with straight handle and 22½ in. with grip handle. It weighs about 16½ lb with guard.

INGERSOLL-RAND CO., 11 Broadway, New York City 4.

* * *

Chrome Moly Electrode for Aircraft Steels

A NEW chrome-and-nickel electrode, "Eutectrode 70", has been specifically developed for use in aircraft and ordnance plants. Also useful for many other production and repair roles, the new electrode has Eutectic's "Frigid-Arc" coating for ease of application and smooth arc. The weld deposit is said to have high tensile strength and a low amperage application for minimum heat affect. It comes in 1/16, 5/64, 3/32, 1/8, 5/32 and 3/16 in. diameter.

EUTECTIC WELDING ALLOYS CORP., Dept. P, 172nd St. & Northern Blvd., Flushing, N.Y.

* * *

Silver Solder Flux

A NEW type of silver solder flux, "Permalatem No. 55," is said to be non-irritating as well as non-fuming. It is also said to possess an excellent wetting action and to prevent burnout of cadmium from the solder.

PERMALATEM WELDING ALLOYS Co., Neptune, N. J.

23,000-Lb Electrode Force on Big Sciaky Spot Welder

UP to two thicknesses of ¼-in. aluminum can now be spot welded with high quality results on the new Sciaky PMCO.6ST spot welder. It has an adjustable electrode force up to 23,000 lb and a rating of 400 kva. It meets and can exceed requirements of AN-W-30 and AN-W-32 specifications, says Sciaky.

Though specifications permit a variation in shear-strength values of welds up to 12½% on a panel having 100 spot welds, the PMCO.6ST has produced welds with shear strengths of plus or minus 7%. Additional tests demonstrate a 90% joint efficiency on lap joints, say company engineers.

A rapid rate of rise of forging pressure is achieved by a diaphragm pneumatic pressure system that eliminates the leathers rubbing against the walls of conventional cylinder heads. A "tailor-made" wave shape is obtained by the virtue of the Sciaky "Three Phase, Modu-Wave" system.

Current conductance efficiency of the secondary circuit is improved by the adaptation of solid electrolytic copper bars with sliding silver contacts at each terminal. This is said to eliminate the "kick" produced by current passage through the flexible cables or shunts ordinarily used.

Peak short-circuit current is 225,000 amp, corresponding to a primary demand of 1,700 kva if only single-

for welding

Controls for arc welders, a big new welder for heavy aluminum and a new air grinder lead off the big Fall roster of New Products. Maybe they'll answer your problems

phase system were being used. The load is said to be balanced at a minimum 85% power factor.

SCIAKY BROS., INC., 4915 West 67th St., Chicago 38.

* * *

Remote Control Operates A-C and D-C Arc Welders

A FOOT-operated variable resistor control for arc welders gives rapid selection of welding currents within the capacity of the machine. Voltage can be varied during welding, instantly changed to meet variations in fit-up and position or can be cut off to extinguish the arc.

Called "Arctrol", the control is said to improve the soundness of welds by providing a hot start. When two or three inches of weld have been made, voltage is easily tapered off, balancing heat input with dissipation.

The control can be fitted to most d-c welders and some types of a-c welders. Its use in no way limits the capacity of the welder nor use of the regular voltage control.

MULLENBACH ELECTRICAL MFG. Co., 2300 East 27th St., Los Angeles 58.

* * *

New 35% Nickel Alloy for Heat Resistance

TO AID in the conservation of nickel supplies, the International Nickel Company has brought out "Incoloy", a 35% nickel, 20% chromium (balance iron) alloy for use under conditions of high temperature and corrosion. It is produced in sheet, strip, rod, wire and tubing. It will take the place in many applications of older nickel alloys.

THE INTERNATIONAL NICKEL CO., 67 Wall St., New York City 5.

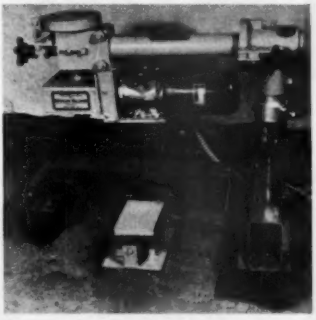
* * *

Improved Features for Low-Pressure Cylinders

NEWEST design and construction features on the Hanna low-pressure cylinders include a cork floater ring that facilitates cushion alignment with the head and insures a seal during cushioning; spring-backed chevron rod packings that are self-adjusting for consistently correct compression and a flange design permitting removal of the front head without disturbing the mounting. The cylinders are designed for operation up to 110 psi on air, oil or water.

HANNA ENGINEERING WORKS, 1765 No. Elston, Chicago 22.

* * *



Power Attachment for Aronson Positioners

A REDESIGNED universal power attachment is now available for the 14C500, 14C1000 and 14B200 Aronson balanced welding positioners.

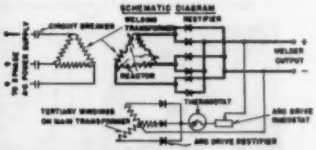
The power unit gives speeds varying from 0 to 6 rpm and has a quick disengagement feature for manual rotation if desired. A worm and worm gear final drive are adjustable to virtually eliminate back-lash on the work table, according to Aronson. A friction clutch coupling allows the operator to position the workpiece on the rotational axis whether the table is turning or not.

ARONSON MACHINE CO., Arcade, N.Y.

* * *

Arc Control Prevents Electrode Sticking

AN extra surge of welding current if the arc becomes shorted, either by electrode contact or a molten globule, is provided by a new arc drive control. It clears the arc path to prevent arc outage or sticking of the electrode. A Westinghouse development, the new control is available on Type RA Westinghouse selenium rectifier welders.



Violent and prolonged overshoots and dropoffs of current don't occur.

Amount of arc drive can be set by the weldor. It has an "off" position for use when the machine is to be short-circuited on low-resistance loads for any length of time, such as resistance heating. A self-heating thermostat is provided in the arc drive circuit to protect it from overheating due to sustained short-circuit of the welding terminals.

WESTINGHOUSE ELECTRIC CORP., Box 2099, Pittsburgh 30.

(More New Products on Page 102)

To meet every INDUSTRIAL X-RAY NEED

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There's no need to improvise or compromise when you buy a General Electric Industrial X-Ray Unit. The comprehensive GE line makes possible the selection of just the right unit to match the type of inspection desired throughout your manufacturing process.

More than a half century of x-ray development, including the pioneering of industrial x-ray apparatus, is reflected in this highly versatile array of industrial x-ray units. Chances are, there's a need for x-ray in your business. Lower your production costs and improve quality. Let one of General Electric's highly-trained application specialists appraise your inspection needs. For full information write — X-Ray Department, General Electric Company, Milwaukee 14, Wisconsin, Box AE-9.

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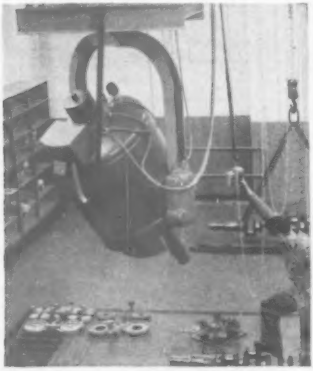
XRD-3—This x-ray diffraction apparatus provides for the use of modern techniques for the study of crystal structures and the relation of these structures to the physical properties of nearly all solid materials.

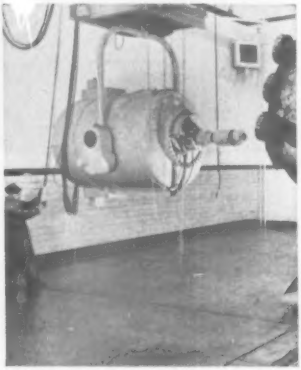
OX-140 — Extremely versatile and efficient . . . with a continuous operating range of from 30 to 140 kvp at 5 to 10 ma. Available in six different models. Invaluable for inspection of low-density metal and other materials.

250 — The world's most popular industrial x-ray unit . . . with an operating range from 60 to 250 kvp, 2.0 to 10.0 ma. This rugged unit is available in seven different mountings to meet varied industrial needs.

OX-400 — Bridges the gap between low and high-voltage equipment. Where cost prevents installation of higher-voltage equipment, yet penetration of lower-voltage units is insufficient, this 400 kvp apparatus is a natural choice.



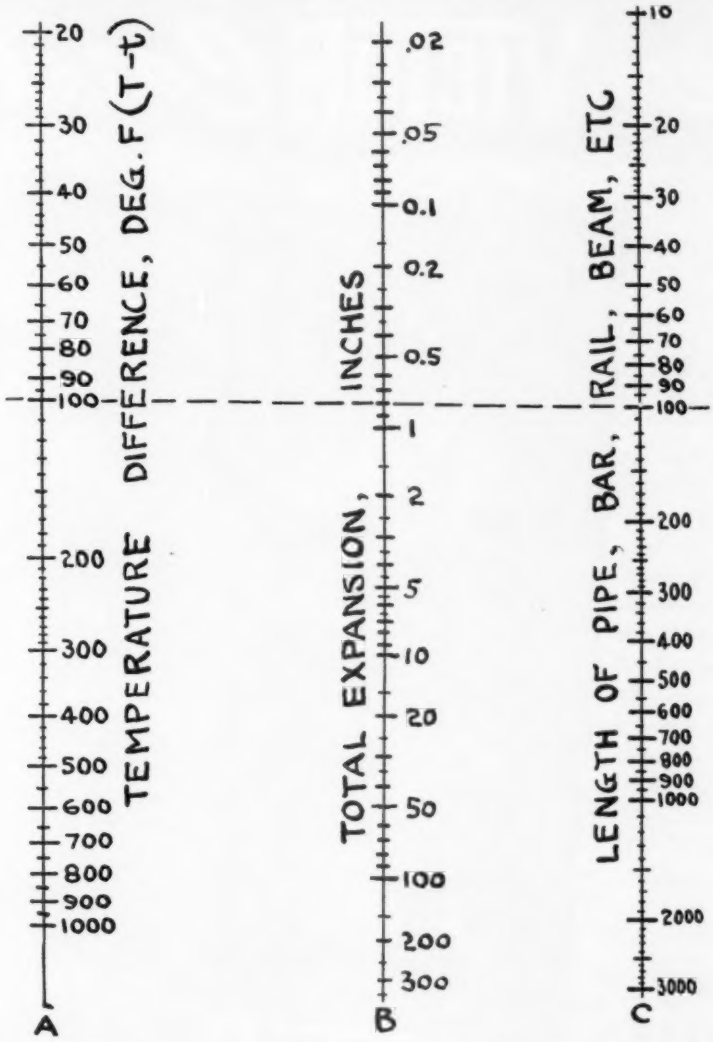
RESOTRON 1000 — The million-volt unit which opened a new era in industrial radiography. Featuring a resonant transformer, multi-section tube, and gas insulation, it operates at 1000 kvp, 3.0 ma, continuous rating.



RESOTRON 2000 — As with the Resotron 1000, this two-million volt unit permits the use of the large-field, reflected x-ray beam for simultaneous radiography of many objects in a single exposure . . . Faster, with greater penetrating power.

15 MILLION-VOLT BETATRON — The present-day ultimate where maximum sensitivity is paramount. Your best choice in magnetic accelerators, for speed, sensitivity, and field size for the radiography of heavy-section thicknesses.

Expansion Chart . . . BY W. F. SCHAPHORST, M. E.



EVER have a problem of determining the expansion in steel piping, rods, tubes, bars, rails, etc. for a particular temperature difference? This handy chart will make longhand figuring unnecessary.

All you need to know is the length of the pipe, rail, bar or whatever it is and the difference between the highest and the lowest temperature to which it is to be subjected. Say, for example, that you have a pipe line 100 ft long to be subjected to a temperature variation of 100 F. What will be its total expansion in inches?

Simply lay a straightedge across the chart or stretch a fine black thread across it, as indicated by the dotted line. The line connects the 100-degree temperature difference, scale A, with the 100-ft length, scale C. The intersection with scale B gives the answer as 0.8 in.

If you know any two of the factors involved, the third is quickly found.

Suppose you know the length and wanted to know what temperature difference would be allowable in order not to exceed a definite amount of space available for expansion and contraction. The chart can work it that way just as well. Simply connect the length, scale C, with the allowable expansion, scale B, and extend this line to intersect the temperature difference, scale A. At the point of intersection with scale A, read the allowable temperature difference.

The range of this chart is wide enough to take care of almost any expansion or contraction problem. The temperature difference, scale A, varies all the way from 20 to 1,000 F. The length varies from 10 to 3,000 ft. And the total expansion between these limits varies all the way from 0.02 in. to 300 in.

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For Your Technical Library—
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A Welding Engineer Reader Service

1 SPOT WELDING ALUMINUM—Sciaky Bros., Inc., Chicago 38. Literature describes the big new PMCO6ST spot welder for joining two thicknesses of ¼-in. aluminum sheet. Features such as "Three-Phase Modu-Wave" wave shape control and new pressure system are explained. See page 62.

2 ARC WELDER CONTROL—Mullenbach Electrical Mfg. Co., Los Angeles 58. Literature tells about "Arctrol" foot-operated variable resistor for controlling output of most d-c and a-c welders. See page 63.

3 ELECTRODE HOLDERS—Cam-Lok Division, Empire Products, Inc., Cincinnati 36. 4-page, two-color bulletin describes and illustrates the new Cam-Lok electrode holder, a product having vertical jaws. Welding cable and terminal connectors are also shown. Each accessory is designated as to application, size and model number.

4 PLASTIC FOR WELDING—American Agile Corp., Plastics Div., Cleveland 3. 8-page folder tells about "Agilene", a polyethylene plastic suited for welded fabrication into bottles, jars jugs and other shapes. Two pages in this folder and another 8-page folder give "Agilene's" chemical, mechanical, electrical and thermal properties under varying conditions as well as data on the fabrication of various shapes.

5 AIR GRINDER—Ingersoll-Rand, New York City 4. 4-page bulletin 5096 describes the new Ingersoll-Rand air-powered grinder for finishing welds and flame-cut edges. Bulletin explains and pictures such features as 20% more powerful motor, overspeed safety coupling, rubber-faced valve, etc. See page 62.

6 SCALING HAMMER—Jack Churchward Welding Accessories, North Haven, Conn. Single-sheet bulletin has a large illustration of the Churchward scaling hammer showing its "parrot beak" pick for slag removal and its special hollow ground head for removing weld spatter.

7 METAL CLEANING—Oakite Products, Inc., New York City 6. 44-page, pocket-size booklet, "Good Things to Know About Metal Cleaning," tells about tank cleaning methods, pickling, de-oxidizing, bright dipping, prepaint treatment in both tanks and machines, etc.

8 STAMPING TECHNIQUES—The Leake Stamping Co., Monroe, Mich. 28-page booklet authored by company president James M. Leake tells how many parts can be stamped and arc or spot welded to make better, lighter assemblies and at low cost and high speed. Many clear pictures show all types of stampings and forgings.

9 HOSE CLAMPS—The Punch-Lok Co., Chicago 7. 12-page catalog describes and illustrates the Punch-Lok method for making leakproof hose connections, splicing electric cable, clamping wire guards, leaks in pipe lines, etc.

THE WELDING ENGINEER will request manufacturers to send readers the literature in which they are interested. Two post cards are printed here, each containing space for four items.

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10 BLAST CLEANING EDGES—Vacu-Blast Co., Inc., San Mateo, Calif. 20-page catalog and brochure gives illustrations and explanations of "Vacu-Blast" equipment for cleaning plate edges with steel abrasive which is immediately picked up by a vacuum to be re-used. Applications for high-speed submerged-arc welding of piping or for cleaning steel mill rolls, bulldozer blades, tire molds, concrete curbs, armatures are also shown.

11 FOOT SAFETY POSTER—D. W. Onan & Sons, Inc., Minneapolis 14. Two-color poster 13 by 18½-in., "A Tale of Woe", is a dramatic picture story showing the dangers of neglecting to wear safety shoes in welderies, machine shops and fabricating plants.

12 COLMONOY CASTINGS—Diamonds and Tools Inc., Detroit 3. 6-page pocket-size folder tells about the hard-facing alloys grouped under the Colmonoy name that are now available as castings in lathe and grinder center tips, chuck jaw inserts, wear strips, collet pads, etc.

13 QUICK-ACTION CLAMPS—Lapeer Mfg. Co., 3056 Davidson Rd., Lapeer, Mich. Literature tells about new 1,200 and 2,000 lb "Knu-Vise" clamps for holding parts of varying thickness. Similar models with toggle action are described and explained. See page 00.

14 REBUILDING TRACTOR ROLLS —Stoody Co., Whittier, Calif. Folder tells about manual arc hard-facing of cast iron top carrier rolls or tractors, a heretofore untried process. Use of the Stoody 105 alloy and its properties are covered.

15 BATTELLE RESEARCH — Battelle Memorial Institute, Columbus, O. 8-page bulletin tells about the production research concept at Battelle and explains some typical research programs carried out.

16 WELDED VIADUCT—The Lincoln Electric Co., Cleveland 1. 4-page reprint tells about the all-welded freeway viaduct that is planned for San Francisco. Details of welded construction, fabrication and erection are explained and diagrammed.

17 WELDING CONNECTORS—Joy Mfg. Co., Pittsburgh 22. Single-sheet, two-color bulletin SM-2 pictures and explains push-lock type connectors for feeder cables to welders. It describes such features as quick connection, molded Neoprene construction, molded-to-cable or attachable styles, etc.

18 EFFICIENT STEEL USE—United States Steel subsidiaries, Pittsburgh 30. 72-page booklet, "Tables of Multiple Lengths," compiled on the basis of dead lengths of steel shows how many given lengths of steel can be cut from a longer piece. It helps users get the most out of available steels.

19 CAVITATION RESEARCH—Allis-Chalmers Mfg. Co., Milwaukee. 20-page bulletin 02B7581 describes cavitation pitting tests made to examine causes of wear on water wheels and turbines. It tells about resistance of welded stainless overlays, etc. to such cavitation action.

20 D-C ARC CONTROL—Westinghouse Electric Corp., Pittsburgh 30. Literature tells about a new "arc drive" control for providing a surge of welding current when the arc becomes shorted. This extra surge clears the arc path and prevents the electrode from sticking. See page 63.

21 BENCH WELDER — Federal Tool Engineering Co., Newark 5, N.J. 8-page bulletin is devoted to the "Tweezer-Weld" line of bench welders for fabricating electronic tubes, jewelry, instruments, and other small parts. It tells about double-pair electrode heads, automatic wire feed for soldering, pressure adjustments for different jobs, etc.

22 STUD WELDING MANUAL—KSM Products, Inc., Merchantville, N.J. 28-page, pocket-size manual provides such information as a description of the stud-welding gun, how to hook it up, standard generator and timer settings, types of welds and operating hints for more reliable results.

23 SPOT WELDING STEEL—Ampco Metal, Inc., Milwaukee 46. 8½ by 11-in. reference chart gives recommended spot welding schedules for joining low carbon steel. Second-quarter issue of *Ampco Welding News* tell how to apply Ampco-Trode" on a centrifugal separator, screw conveyor shafts, cable idlers and cement mill pinion.

24 SHIPYARD STUD WELDING — Nelson Stud Welding Div., Lorain, O. 26-page application portfolio tells all about current uses of stud welding on ships. It includes a reprint of Bureau of Ships shop technique folder No. 98 describing stud welding in naval building and maintenance.

25 ALUMINUM BRAZING — All-State Welding Alloys Co., Inc., White Plains, N.Y. 4-page pocket size folder gives readable instructions on how to braze sheet and cast aluminum.

26 FLEXIBLE SHAFTING — Elliott Mfg. Co., Binghamton, N.Y. 8-page, two-color folder No. 207 shows how Elliott flexible shafting for power transmission can be adapted to grinders, pumps, vibrators, etc.

THE WELDING ENGINEER will request manufacturers to send readers the literature in which they are interested. Two post cards are printed here, each containing space for four items.

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"With EVERDUR 1010 we make these welds in 3⅓ to 5 seconds each!"

Mr. Rosenberger points to Everdur braze-welded corner seams in 20-gage steel desk component.

says Albert F. Rosenberger, Production Director, Peerless Steel Equipment Company, Philadelphia, Pa., manufacturers of fine steel office furniture and filing cabinets.

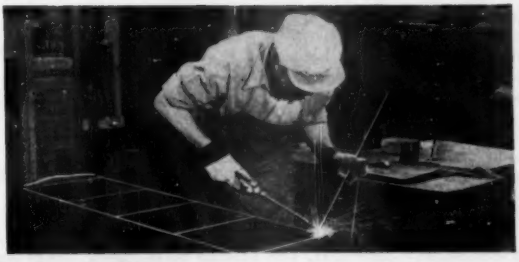
"We use Everdur* (copper-silicon alloy) 1010 Welding Rod on every unit we build," continued Mr. Rosenberger. "Every corner seam in every desk and cabinet we make is brazed with Everdur for strength and rigidity. And it's rustproof.

"But Everdur gives us more than quality—it speeds production and cuts our cost. In filing cabinets, our Everdur braze welds average 5 seconds each. In desks, three seams come close together and we braze-weld all three with Everdur in 10 seconds.

"Such speed would be impossible without the low-temperature-melting, free-flowing characteristics of Everdur 1010 Welding Rod. And we need no flux. No finishing. For 21 years we've used Everdur in work like this."

ANACONDA Welding Rods are made in many types, but they are alike in one thing—every type does its work well. Your ANACONDA Welding Rod Distributor can help you decide which to choose for your job. Or, write for Publication B-13 to The American Brass Company, Waterbury 20, Connecticut. In Canada: Anaconda American Brass Ltd., New Toronto, Ontario. 5181

*Reg. U. S. Pat. Off.



Welder in Peerless plant filling corner seams of 20-gage steel cabinet with $\frac{3}{32}$" Everdur 1010 Welding Rod, using oxyacetylene torch.

braze or weld with confidence . . . use

ANACONDA®
WELDING RODS

on the job

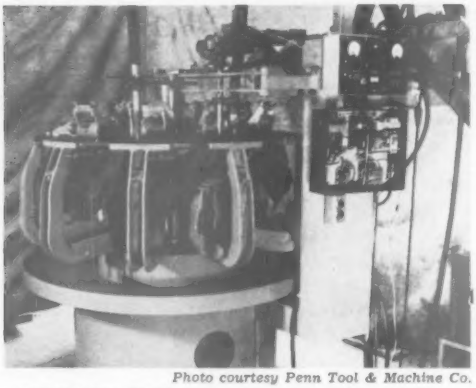


Photo courtesy Penn Tool & Machine Co.

AUTOMATIC FIXTURE was designed to weld a plate at right angles to the blade of a laminated plowshare

Photo courtesy Driver-Harris Co.

ALL-NICHROME muffle for a shaker hearth furnace was made by welding the large cast sections together

Plowshares Precision Welded

WELD PENETRATION to exactly the right depth features the operation of a new automatic welding fixture used by a farm implement manufacturer to weld a plate at right angles to the edge of a laminated plowshare blade. An automatic welding head operating at 500 amp deposits a smooth, dense bead of about 7 in. in length. Estimated saving in production amounts to 20c on each plowshare.

Previously, plowshares have been forge welded, blacksmith style, or manually welded by arc or torch. The biggest stumbling block to welding is the laminated construction of the blade. The outside layers that strike the soil, cut it and turn it over must be hard and resistant to abrasion. Toughness, to withstand the hitting of buried rocks, tree roots and other hidden obstacles, is the prime requisite of the middle layer. Hence the blade's construction is that of a sandwich with a layer of mild steel between two layers of high-carbon steel. This introduces a difficult welding problem.

In welding the right-angle plate to the blade, the requirement is that the weld must penetrate through one hard layer and the soft middle layer but must not be allowed to touch the outside hard layer. This is accomplished by controlled automatic welding. Automatic starting and stopping switches for the welding head leave the operator free to devote all his time to inserting the workpieces and taking off the finished weldments.

Another advantage of the set-up is its automatic flux-recovery system. Flux is deposited by flexible tube on the unfused portion and sucked up by the vacuum of the flux-recovery tube (left in the above illustration).

* * *

It Shivers at 1,700 F

WELDED MUFFLE shown in the right picture above will go into a shaker hearth furnace built by the American Gas Furnace Co., of Elizabeth, N. J., for heat treating. The muffle receives a vibratory motion that makes the work being heat treated slide slowly through it for carburization at 1,700 F.

This particular muffle is one of various sizes, some smaller and some larger, which are made by the Driver-Harris Co., of Harrison, N. J., for the furnace manufacturer. The muffles are hung from hanger rods in the furnaces to permit a bumping mechanism to move the work along the inside bottom of the muffle at any predetermined speed for discharge into a direct quench. As these furnaces operate in a range of from 1,500 to 1,800 F, the muffles must be made of an alloy that will withstand such temperatures. The alloy that has stood up the best is "Nichrome," which contains approximately 60% nickel, 15% chromium and the balance iron. The welding procedure is the same as recommended for all high nickel-chromium alloys, using a coated electrode made of the same composition of Nichrome wire. The welder is set at reverse polarity.

These muffles are made of a number of cast sections that must be welded together. The one shown in the picture has a one-piece cast bottom, three top sections (including part of the discharge chute), a discharge extension, an end plate and 18 hanger-rod lugs. The hanger lugs are welded on because it is not possible to make them an integral part of the long cast section and have them free of defects. Total weight of the muffler is around 1,400 lb.

After the various sections have been cast and cleaned, each edge to be welded is ground to a large chamfer. The Driver-Harris foundry then tack welds the castings into position and arc welds all joints and lugs. The inside bottom of the muffle must be smooth to permit the work to travel on it so it is either hand ground, flat machined or else machined with grooves, depending upon the product that is to be heat treated in the particular furnace.

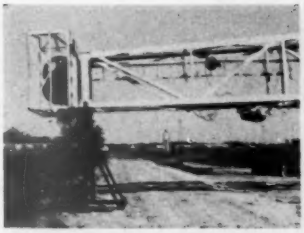
The life of the muffler and its welds varies from about 2,000 hours up to 10,000 hours or more, depending on the severity of the heat-treating requirements.

* * *

Support for Oil Derrick

By Elton Sterrett

A WELDED support fabricated from pipe lengths and sections of I-beam is used by a drilling contractor to hold the upper end of an oil derrick when it is moved from one drilling location to another. The upper end of the derrick is let down onto the pipe support instead of being lowered onto the bed of a truck trailer or to the ground for later handling by truck.



PIPE SUPPORT aids in moving an oil derrick. Truck can drive underneath derrick to pick up the load

When on the support, the upper end of the derrick is so positioned that a truck can easily be maneuvered beneath it to place the load on a bolster.

The pipe support also permits ordinary vehicular traffic around the rig during the moving operation. It provides 7 feet of roadway clearance, which is ample for all cars and for light trucks.

Base of the support was formed from 3-in. pipe welded into a rectangle. Side members are 8-ft sections of 6-in. I-beams; these were welded to the base and to diagonal braces of 2½-in. pipe. To guide the structure while it is being lowered, guides were welded as extensions to the ends of the I-beams.

* * *

Delicate Resistance Welding

ASTATIC CORP., Conneaut, O., makes acoustical devices requiring a number of intricate operations. Acoustical characteristics considered in the designs are always, to a certain extent, incompatible with ideal mechanical conditions. The result is that problems of great difficulty are created for production men.

As the parts become smaller, tolerances tighten and the requirements of production quality continue to grow until they reach levels usually achieved only in the laboratory. Astatic met the problem of joining delicate parts into precision assemblies by installing bench welders with electronic controls. According to the Raytheon Mfg. Co., of Waltham, Mass., the setup for one very critical job of spot welding operated for as long as eight hours without adjustment and for weeks without major attention.

Some of these welders are attached to multiple-operation machines. Others are set up in assembly lines, and many are working on single bench operations. The flexibility of "unit installation" enables Astatic to incorporate power supply and welding head independently as they are needed.

PAGE *Stainless Steel*

WELDING ELECTRODES

Armor Welding Electrodes

. . . and All Standard Types

AC or DC . . . the BEST

. . . for any weld

on all types

of stainless steel

STAINLESS STEEL has great strength . . . but its strength is limited by the quality of welds which seal the joints. In all kinds of manufacturing—military work in particular—stainless is being used more widely. If you weld stainless, choose electrodes with care.

PAGE STAINLESS STEEL ELECTRODES, AC or DC, give a stable arc under all conditions. The metal flows smoothly. Slag is clean and easily removed. The coating resists cracking down to very short stubs. Now available in 10-lb. lined, hermetically sealed metal cans which can be reclosed. ***Be sure . . . specify Page Stainless Steel Electrodes.***

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AMERICAN CHAIN & CABLE

PAGE WELDING ELECTRODES

Photo courtesy General Electric Co.

FOUR WELDERS on "jumbo" carriage join 23-ft diam sections on 1,138 ft outlet tunnel for big Idaho dam

Photo courtesy Linde Air Products Co.

RINGS AND RAILS make maneuverable carriage for cutting torch. Intricate straight line designs are easy

NEWS

Whitehead Metal to Hold 3-Day Clinic at Buffalo

NEW brazing and welding techniques will be demonstrated to eastern welding men at the three day welding clinic to be held by Whitehead Metal Products Co., Inc., Buffalo, N. Y., Sept. 26, 27 and 28.

Bowing to the enthusiastic reception given the Whitehead welding clinic at Baltimore last year, this year's program will contain similar events. There will be demonstrations of gas, arc, inert arc, induction and resistance welding and brazing. Lectures on all types of welding will be given by representatives of: The Aluminum Company of America, The American Brass Company, American Brake Shoe Company, Crucible Steel Company, Handy & Harman, Induction Heating Company, The International Nickel Co., Inc., and Lukens Steel Company.

* * *

Pennsylvania Optical Company Adopts Pension Plan

A PENSION plan providing a minimum of $125 a month, including Social Security, for each retired employee has been established by the Pennsylvania Optical Co., Reading, Pa. The plan, wholly financed by the company, covers all plant and office workers with the exception of President Charles R. Essick. Among other products, the company manufactures welding glasses and goggles.

* * *

Turco Products Takes Over Dye Penetrant Manufacture

INTEREST in the "Dy-Chek" non-destructive method of testing has increased so substantially that Northrop Aircraft, Inc., has decided to expand this activity through a licensing agreement with a big chemical producer. The new Dy-Chek division of Turco Products, Inc., Los Angeles, has been selected to assume both manufacturing and distribution of the dye penetrant.

Turco's research laboratories, its 11 district offices and its 150 field men will be available shortly for any technical help in connection with "Dy-Chek" inspection problems.

* * *

23-Ft Diameter Pipe Welded from Inside

A LARGE upright circular scaffold (see picture at top left) carried four d-c arc welders inside the 23-ft diameter steel outlet tunnel of the new Lucky Peak Dam under construction on the Boise River. Total length of the tunnel is 1,138 ft.

Weldors joined 40-ft sections of the tunnel by manual arc welding. Each section consisted of four "hoops," each made from three 10 by 24 ft ¾ or ½-in. plates. Submerged-arc welding was used by the Olson Mfg. Co., Boise, Idaho, to fabricate the sections, which were then trucked by special trailer eight miles to the dam site.

So that only inside welding would be required in the field, a butt-strap back-up plate was shop welded to the ends of each section. One-half strap extends over each end. Each section is also braced with 12 stiffener tees. The butt-strap back-up also helped to line up the sections.

* * *

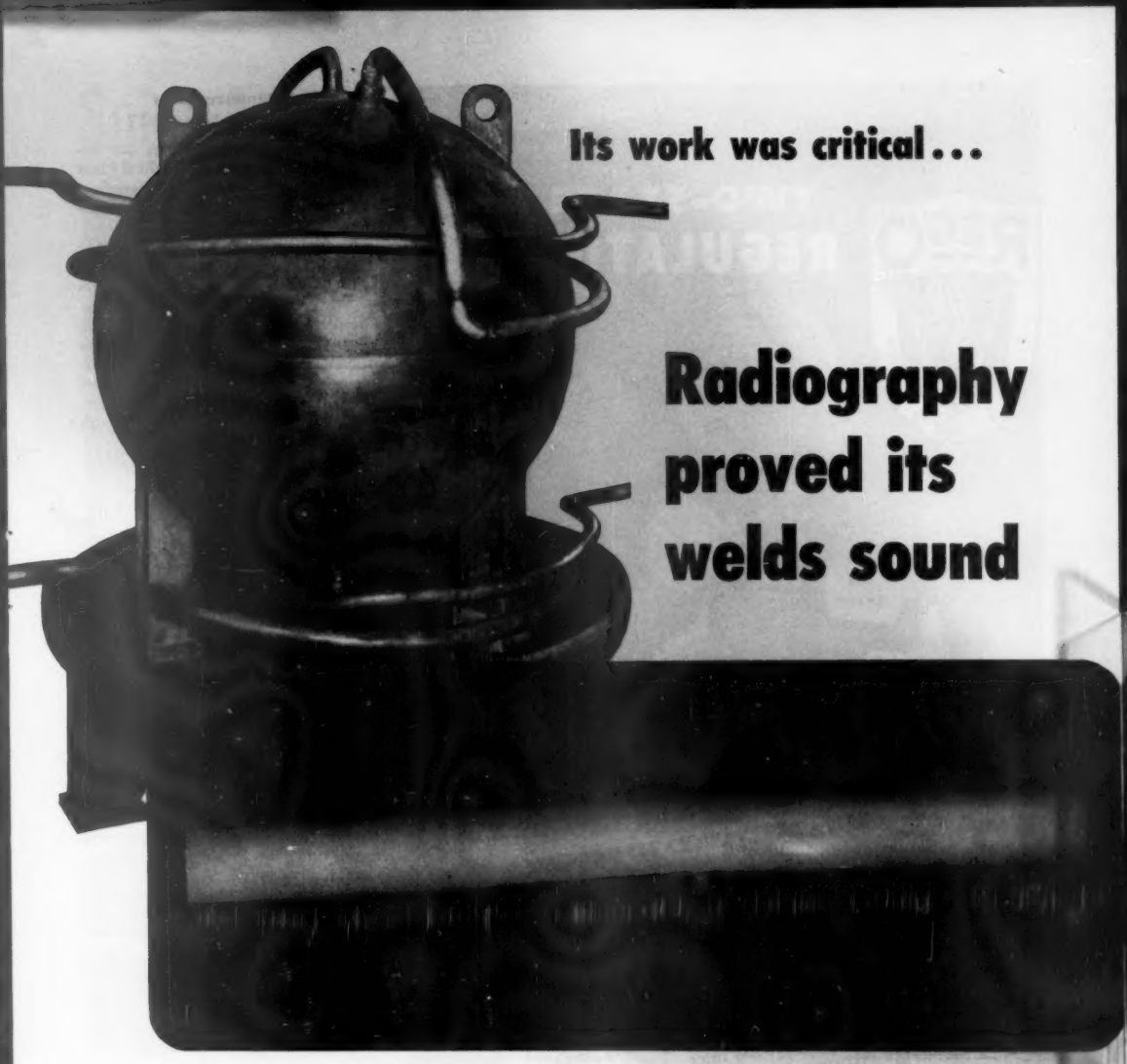
Jig to Speed Flame-Cutting Designed by Missouri Shop

STRAIGHT-line cuts in any direction without moving the workpiece are possible with a unique jig designed by the proprietor of a Missouri welding shop, the C. E. Cummings Co., of La Due, Mo. (see picture at top right).

Base for the jig is a sturdy table, to the top of which is bolted a circular steel band about 5 ft in diameter. Riding on the band by means of a series of rollers is a second steel band. For a third of the circumference of this second band is attached a round bar railing.

This railing supports one end of the track on which the cutting machine rides. The track just rests on the railing, which allows the operator to move the track around it. The opposite end of the track is fastened to a swivel joint on the revolving steel band. By turning the steel band or sliding the track, the operator can position his machine for any direction of cut.

It is especially easy to cut heavy plate with this machine, the inventor claims, because there is no time lost in shifting the weight of the plate around.



Its work was critical...

Radiography proved its welds sound

THIS welded sphere was made to do a vital job in an important project. The welded girth seam had to be sound. What's more, the engineers had to know it was sound.

That called for radiography. For radiography would reveal any serious lack of fusion or gas porosities. It would prove the soundness of the weld.

This is one reason radiography has opened new fields to welders. It is the reason welding has become accepted even in making pressure vessels.

If you would like to discuss the ways radiography can help increase your business and build a reputation for high-quality work, get in touch with your x-ray dealer.

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X-ray Division · Rochester 4, N. Y.

Radiography...

another important function of photography

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Precision Regulation for
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The precision performance of a two-stage RegO Regulator is especially desirable for piped distribution systems and other applications where large volumes of high pressure gases must be controlled accurately.
Two-Stage Regulation Gives You Plus Performance!
Constant delivery pressure regardless of drop in pressure at the inlet . . . Patented design incorporates nozzle-type first stage counterbalanced by stem-type second stage . . . Triple action cartridge filter eliminates troubles usually caused by rust, dust or dirt.
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PIONEER AND LEADER IN THE DESIGN AND MANUFACTURE OF PRECISION EQUIPMENT FOR USING AND CONTROLLING HIGH PRESSURE GASES
REGO
Reg. U. S. Pat. Off.

Plant Maintenance Show at Philadelphia, Jan. 14-17

MORE than 200 companies are expected to participate in the third Plant Maintenance Show, to be staged at Convention Hall, Philadelphia, January 14-17, 1952.

Concurrently with the show, the Plant Maintenance Conference will be held, with many technical sessions on every type of maintenance problem. Chairman of the conference is L. C. Morrow, consulting editor, *Factory Management and Maintenance*. Information about the show and conference can be obtained from Clapp & Poliak, Inc., 341 Madison Ave., New York City.

* * *

Semiautomatic Welding at Australian Shipyard

SHIPBUILDERS at the Broken Hill Pty. Whyalla shipyards in Australia are preparing for use a semiautomatic welder for joining ship plates as it rests on the ways. At present they use two automatic welders for joining subassemblies in ¼ and ½-in. plate.

C. F. Tilson of the Whyalla shipyards recently delivered a paper on welding at the Australasian Institute of Mining and Metallurgy in which he pointed out some of the advantages of welded construction for shipbuilding. These include less water resistances to hulls as higher speeds become more common, less covering composition for flush welded decks, weight savings of up to 10% and elimination of planing and caulking of plates. He said that 4,500 tons of steel in the currently constructed YAMPI class vessel includes 1,100 tons of welded structure. New 10,000 ton ships will have 4,300 tons of welded assemblies.

—*McGraw-Hill World News*

* * *

New Aluminum Plant to Be Built In Texas

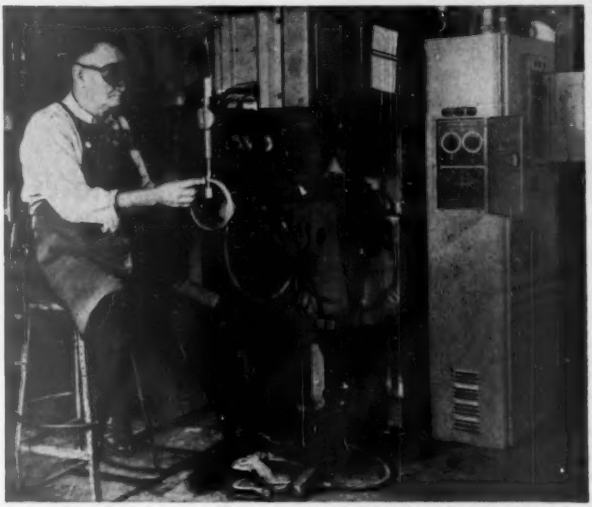
A NEW aluminum plant to be built by the Aluminum Company of America some 60 miles south of Waco, Tex., will have a production capacity of 85,000 tons of aluminum when completed in the early fall of 1952.

* * *

Nickel Output Increased 1,000,000 Lb Monthly

A MAJOR program of underground mining capacity, metallurgical process changes and the installation of emergency facilities has increased the monthly output of nickel by International Nickel Company of Canada, Ltd., by more than 1,000,000 lb.

Solar Aircraft Welds Close to the Edge



Material does not split out, spattering is reduced on this jet engine part because G-E slope control permits a gradual increase in welding current that also reduces tip pick-up and spatter. More welds can be made before electrodes must be cleaned. Welds are sound and uniform. Bulletin GEC-534.

G-E Slope Control for Resistance Welding Prevents Split-outs on Stainless Steel Jet Engine Parts

More precise work possible with this resistance welding accessory used with G-E synchronous control.

Be sure of consistent, high-quality welds with these G-E Accessories

DETERMINE THE BEST TIMING FOR A JOB **Portable, inkless G-E cycle recorder makes a record of the exact timing on test welds, is then used as a check to verify the setting on machines in production. Bulletin GEC-376.**

HOLD WELDING CURRENT CONSTANT **Regardless of line-voltage variations of as much as plus 10 per cent and minus 20 per cent, the G-E electronic voltage-regulating compensator holds welding current constant. Bulletin GEA-4223.**

REDUCE BRITTLENESS **Heat treat medium-carbon, low-alloy, or high-alloy steel with G-E tempering control. Easily installed and operated. Adjustable to suit thickness and type of metal welded. Bulletin GEA-4201.**

MEASURE ELECTRODE FORCE **Check existing gages on spot, seam, or projection welders or at time of set up. Easy to use, saves time, acts as a production check. Force range: 0 to 4500 pounds. Small, portable. Bulletin GEA-3628B.**

PREVENT CURRENT VARIATIONS **Where the insertion of magnetic material in the throat of the welding machine causes weld variations, the current-regulating compensator keeps current constant to within plus or minus two percent. Bulletin GEA-4207.**

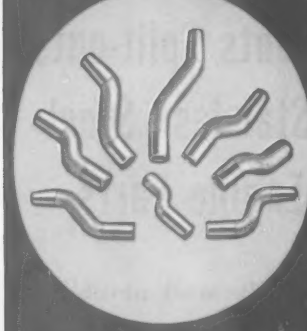
Solar Aircraft, like many other plants working on jet engines, has found G-E synchronous control, with slope control added, will enable operators to work to closer tolerances, produce faster, with fewer rejects. The part shown is welded close to the edge but does not split out, and spatter is reduced on both stainless and mild steel.

Use G-E Synchronous Control wherever AN-W-30 and 32 specifications must be met. It assures consistently uniform high quality welds—operates quietly, requires little maintenance. Like all G-E electronic equipment, it has long life, is enclosed in a compact unit that may be mounted on the welding machine or wherever convenient. Easily inspected. Write today for Bulletin GEA-4699. *General Electric Company, Schenectady, N. Y.*

GENERAL ELECTRIC

648-54

For Longer Runs and Lower Costs



. . . resistance-weld with AMPCO WELD® cold-bent tips

Ampco Weld cold-bent offset tips are made without patterns or special dies. Cold bending retains all physical properties too. Moreover, because holes bend with metal, there's no special drilling needed for water passages. That's why you get prompt service and fast delivery when you use Ampco Weld cold-bent tips.

But that's not all you get. You get longer runs and lower costs too — because the water passage gives you cooling right to the welding face. So, place your order today and enjoy all these advantages.

. . . and AMPCO *Engineering Service when you need it*

Behind the famous Ampco Weld line of resistance-welding products is a corps of experienced engineers, ready to help you solve your problems. Just get in touch with us.

AMPCO METAL, INC.

AMPCO®

Dept. WE-9
MILWAUKEE 46, WISCONSIN

It's Production-Wise to Ampco-ize

RW-2

"Cold" Butt Weld Joins Aluminum Wires

NEW technique for joining non-ferrous wires and rods by "cold" butt welding has been developed by Koldweld Corp., New York City. Joints in aluminum to aluminum, aluminum to copper and copper to copper rods are said to compare favorably in strength with the parent metal.

Butt-welded rods readily respond to trimming of the weld flash and drawing down to smaller diameters. After drawing, it is hard to see the location of the weld.

Tools required for the new butt welding process are extremely simple, says Koldweld. Small sizes of wire and rod can be joined with a hand tool.

For the electrical industry, new developments in cold pressure welding include a "tack" weld for attaching flat sheets or tubing to a rod. Resistance of the weld to electricity is said to be less than in the original conductor.

Improved techniques for producing tubing from flat ribbon and sheet stock have also been evolved. The new tubing is smooth inside and outside. Largest tubing produced is 6 in. in diameter, the smallest ⅛ in. Such tubing can be threaded, drawn, bent, flared and shaped.

Most ingenious application of the Koldweld technique has been the production of a sturdy and attractive aluminum water kettle.

* * *

Dagmar Welding Photos Sent to 50,000 Weldors

SOME 50,000 pin-up photographs of Dagmar, famous NBC television star who was voted "Miss Weldor of 1951" by the National Eutectic Weldors' Club, have been sent to weldors all over the country by Eutectic Welding Alloys Corp., Flushing, N.Y. Dagmar appears in glamorized weldor's garb (see page 56, July issue, THE WELDING ENGINEER) on an 8 by 10 glossy photo.

SPATTER *Doesn't* MATTER...

ON A HARGRAVE® WELDERS' CLAMP

NO. 41 LIGHT SERVICE

NO. 45 DEEP REACH

NO. 43 HEAVY SERVICE

SPRING CLAMP

For spot welding and other light duty welding. Holds firmly, releases instantly. Useful where speed is needed. Every shop needs a few.

INDIVIDUALLY TESTED

Hargrave Nos. 41, 43 and 45 Welder's Clamps resist spatter permanently because the Patented screws are made of an anti-spatter, solid alloy material—not to be confused with ordinary plated types of screws. They speed your work . . . ease the job and give years of trouble-free service. Frames are forged steel, heat-treated and designed to give greatest strength for weight. Oscillating (ball and socket) tip is put on to stay. Each clamp is Individually Tested. Openings in all popular sizes.

WRITE FOR CATALOG

showing the complete line of Hargrave Individually Tested Clamps, Chisels, Punches, Star Drills, Bruce Wrenches, File Cleaners, Washer Cutters, etc.

There is an Industrial Distributor Stock near you.

HARGRAVE®
The Cincinnati Tool Co.

1944 Waverly Ave.
Cincinnati 12, Ohio

AWS Metallizing Committee Tests Steel Specimen

THE American Welding Society's committee on metallizing has organized a test program to determine the corrosion resistance of steel having metallized coatings of zinc and aluminum.

More than 4,000 specimens will be sprayed with aluminum and zinc coatings in thicknesses of from 0.003 to 0.015 in. with and without vinyl cover coats. After spraying is completed on all specimens, sometime this fall, they will be assembled for exposure at corrosion test sites at Kure Beach, N. C.; Point Reyes, Calif.; the Gulf Coast; New York City and Wrightsville Beach, N. C. Exposures will be for periods of one, three, six and twelve years.

Arrangements will be made for examination of exposed specimens at regular intervals and for issuance of periodic reports. If interested in securing a copy of the program or progress reports, you may write to the secretary of the metallizing committee, AWS, 33 West 39th St., New York City 18.

* * *

Miller Electric Adds Big Press

AN 85-ton punch press to be used in the manufacture of selenium-rectifier d-c welders will be installed shortly at the plant of the Miller Electric Manufacturing Co., Appleton, Wis. Special heavy footings will be constructed for the floor under the new press.

Second floor of the plant is being extended to meet the wall of the new press room to add approximately 1,200 sq ft of office space. This will give room for more engineering space and a modern laboratory. Also, about 1,110 sq ft of floor space for loading will be provided by enclosing the present loading ramp.

* * *

Burdett's Dayton Plant to Handle G-E Weldors

THE new Dayton, O., branch of the Burdett Oxygen Co., Cleveland, will serve as distributors for a complete line of G-E welding equipment. About 2,000 items of welding and cutting tools and more than 100 accessory items will be stocked at Dayton.

The new plant makes about 2½ million cu ft of oxygen per month, and future plans call for an additional building to house an acetylene generator.

Karl Bird is in charge at Dayton for Burdett.

Get Accurate Gas Control...

on welding and cutting with...

Gasweld

R22 Gasweld Regulator for heavy duty cutting and welding.

REGULATORS

Non-fluctuating large volume gas flow is a "most liked" feature of famous "Gasweld" Regulators—No "pressure drop" when the cut is started. They are first choice of on-the-job welders because of their accuracy, simple construction, long life, easy adjustment and trouble-free operation. *Write for illustrated booklet and facts.*

DISTRIBUTORS: Liquid offer you a complete line of industry-proved, nationally-used, top-profit welding and cutting equipment.

Other models are available for light and heavy duty work for welding and cutting, for regulating line pressure and for brazing, soldering & similar operations.

Industrial Gases
We manufacture a full line of industrial gases — Acetylene, Oxygen, Hydrogen and Nitrogen.

MAIL COUPON TODAY!

THE LIQUID CARBONIC CORPORATION
Industrial Gas Division
3110 S. Kedzie Ave., Chicago 23, Illinois
Gentlemen:
Please send complete data on Gasweld Welding and Cutting Torches and your new catalog of equipment and supplies.

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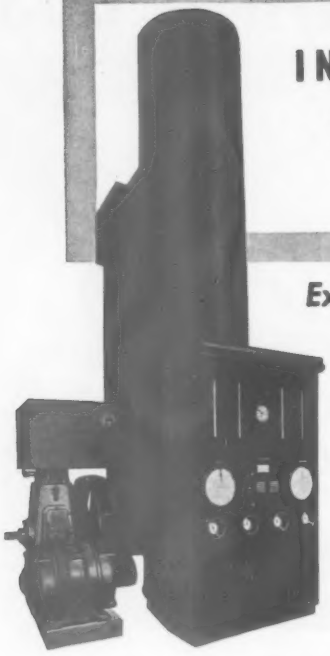
*Town*_____ *State*_____



INDEPENDENT
GAS PRODUCING
PLANTS

Expansion Engine Type
Low Pressure
OXYGEN
AND
NITROGEN
Producing Plants

Built in standard sizes—15 meters or 530 cu. ft to 283 meters or 10,000 cu. ft.—in single and double rectification units. If you need them, larger sizes are available.

If the more than one quarter of a million INDEPENDENT CYLINDERS we have built were filled at one time, they would hold more than 50,000,000 cu. ft. of gas!

Furthermore, Independent Acetylene Cylinders hold from 5 to 10% more gas, and the uniformity of the monolithic filler insures even distribution of acetone. Oxygen Storage cylinders available in 12' and 20' lengths; capacities 850 and 1500 cu. ft.

10 C.F. 40 C.F. 60 C.F. 100 C.F. 150 C.F. 250 C.F. 300 C.F. 340 C.F.

WE INVITE YOUR INQUIRIES

INDEPENDENT ENGINEERING COMPANY, Inc.
Manufacturers of
CONSULTING · RESEARCH · DESIGNING
CYLINDERS AND GAS PRODUCING EQUIPMENT
ACETYLENE · OXYGEN · HYDROGEN · NITROGEN

Courtesy Oxweld Railroad Service Co.

SNAKING off cars, rail sections make longest two rails in world

Welded 19,800 Ft Rail is World's Longest

ALL THE clickety-clacks are gone from two 19,812-ft rails on the Elgin, Joliet and Eastern Railway near Joliet, Ill. These 3¾ mile lengths were made by oxyacetylene pressure welding standard 39-ft rails into 1,600-ft strings. The 1,600-ft lengths were then hauled out to the right-of-way and laid like regular rails. Finally, they were joined into the 19,812-ft lengths by manual oxyacetylene welding.

The Elgin Joliet and Eastern began laying welded rail in 1943. By the end of 1951, it will have 90 miles of track with continuous rail, more than any other on the continent.

• • •

Alloy Rods Appoints Long and Stewart Agencies

W. H. LONG Co., York, Pa., and the James A. Stewart Co., Carnegie, Pa., have been given joint charge of national advertising and merchandising for the Alloy Rods Co., York, Pa. Alloy Rods was founded in 1939 and is today one of the nation's largest producers of stainless steel, alloy and hard-facing electrodes.

• • •

New Tempilstik Distributor

SOUTHERN OXYGEN Co., Inc., Washington, D. C., has been named a distributor of Tempil Corporation's line of temperature-indicating materials. Tempil products will be handled in Southern Oxygen's 14 district offices located in Pennsylvania, New Jersey, Delaware, Maryland, Virginia, West Virginia, North Carolina, South Carolina, Tennessee and from Southern Oxygen distributors.

You'll do
BETTER WELDING
Faster, Easier with

HANNA®

CYLINDER POWER

AND

EXACTING VALVE CONTROL

In many of your welding operations you can use the smooth, dependable power and control of Hanna Cylinders and Valves to excellent advantage . . . for pushing, pulling, lifting, pressing or clamping . . . for jigs, fixtures or pilot operations . . . for replacing slow, tiresome manual work . . . for simplifying the actuation and control of your present equipment . . . for new machines being designed . . . for 101 uses where *consistent*, regulated power is desirable.

Improving welding operations is another one of the thousands of applications throughout industry where Hanna Cylinders are at work improving performance, speeding production, cutting costs.

Hanna Cylinders are available in low pressure models that operate by air, oil or water up to 250 p.s.i. and in high pressure hydraulic models operating to 1500 p.s.i., in a range of mounting styles to meet all requirements. Hanna Valves, including hand-operated, foot-operated, solenoid, pilot and speed control valves, are available to provide the finest combinations of controls for desired circuit arrangements.

Have an experienced Hanna Sales Engineer help you decide on where and how you can use Hanna Cylinder Power to advantage in your plant.

50th Anniversary 1901-1951

Hanna Engineering Works

HYDRAULIC AND PNEUMATIC EQUIPMENT . . . CYLINDERS . . . VALVES . . . RIVETERS

1771 Elston Avenue, Chicago 22, Illinois

Another typical ROBOTRON installation to help keep American industry at peak production. Custom-built, each of the 24 units is a complete package with 200 ampere switch, 38 timer and 600 ampere frame-Ignitron contactor.

Robotron SQUEEZES MORE PRODUCTION FROM MAJOR AUTOMOTIVE WELDING LINES.....

To an industry, world renowned for its progressiveness, ROBOTRON electronic control systems have proven to be a dependable factor in better production line assembly. Size of installation, illustrated above, is a good example of one manufacturers confidence in ROBOTRON'S ability to deliver higher production, more accurately, with less maintenance and costly down-time. Centrally located, this compact overhead island of welding timers, with catwalk high over production line, also features overhead power lines which drop directly to a large bank of nearby welding transformers and welding guns. Best of all, with ROBOTRON quick interchangeable "Brain" and "Power" panels, Spot and Pulsation welding machines can utilize same basic welding timer-control from operation to operation. Easy to install, replace or service, all functional elements are simply and sturdily built for hard use and long life.

If welding production is a factor in your manufacturing defense or civilian products, ROBOTRON engineers are anxious to demonstrate or advise on similar installations geared to your specific needs.

THE FINEST IN INDUSTRIAL ELECTRONICS

Write today for Electronic Literature, Application and Engineering Data . . . No obligation of course.

Robotron CORP.

5570 W. Chicago Blvd., Detroit 4, Mich.

8207

STRIKING portal greets workers at Lincoln Electric's new factory

Lincoln's New Plant Opens This Month

WORKERS employed by The Lincoln Electric Company, Cleveland, will walk through the striking brick, glass and aluminum entrance portal of the company's new building this month. From the entrance, they will pass through a tunnel leading to their work stations.

As they go through the doors, they will be greeted by a motto on the facing wall. "The Actual is Limited. The Possible is Immense."

• • •

Weldor Receives $1,194 for Loss of His Job

A RECENT ruling of the National Labor Relations Board entitles Weldor Thomas Ray Watson, of Los Angeles, to $1,194.94. The AFL International Brotherhood of Boilermakers and American Pipe and Steel Corporation will pay him $600 and 599.94, respectively, to compensate him for the loss of a job at which he worked only one day.

The board found that Watson was illegally ousted from his job with American Pipe and Steel through the efforts of the union because he had not obtained his job through the union hiring hall. The company was held jointly responsible as a party to the unlawful discharge.

• • •

Welded Prefabrication Speeds 666-Ft Lakes Ship

BIG sections are being submerged-arc welded in the shop to speed completion of the 666-ft self-unloading cargo vessel that is being built for U. S. Steel's Bradley Transportation company at Manitowoc, Wis.

Designed to be the largest self-unloader on the Great Lakes, the new freighter will carry limestone from Calcite, Mich., to lower lakes ports. Its loaded speed will be about 16 mph and its capacity 20,000 gross tons of stone. It will have a 7,000 hp turbine gear drive.

Ingalls Yard Delivers New C3 All-Welded Ship

THE first cargo vessel under a government ship building program since the end of World War II has been delivered from the Ingalls Shipbuilding Corp. yard at Pascagoula, Miss. Named the *Schuyler Otis Bland* by her builders, the fast, dry-cargo ship may be the forerunner of others for quantity production should an emergency arise. Her classification is designated as C3-S-DX1; she is of all-welded construction.

The *Bland* is 477 ft 6 in. long with a deadweight tonnage of 10,500, about the same as the famous Liberty and Victory types. For power, her steam turbine delivers 12,500 hp for a sustained speed of 18½ knots.

The ship has a streamlined dummy stack that encloses the upper conning station, engine room skylight and ventilation openings. The actual stacks are two tall uptakes aft of the dummy funnel that harmonize with the tapering kingposts.

The American President Lines, San Francisco, has chartered the vessel from the U. S. Maritime Administration for a round-the-world run. It will be operated under the close surveillance of Maritime Administration experts to check performance for any possible changes or modifications.

* * *

Non-Destructive Testing Society Meets at Detroit, Oct. 15-18

ELEVENTH annual meeting and convention of the Society for Non-Destructive Testing will be held at the Hotel Detroiter, Detroit, October 15 to 18, the week of the Metal Show and AWS convention.

Technical sessions will be held on Monday, Tuesday and Thursday mornings. On the agenda are such subjects as ultrasonic methods of testing engineering materials, magnetic-particle inspection, radiographic inspection, statistical quality control, etc. Wednesday will be taken up with a symposium on testing of jet engine parts and ordnance material.

The 1951 Lesture Lecture will be given Thursday afternoon after which the annual business meeting will be held. For information about the meeting, you may write to the Society at 1109 Hinman Ave., Evanston, Ill.

* * *

New Ampco Distributor

AMPCO METAL, Inc., Milwaukee, has appointed R. J. Greer Equipment Co., 116 So. Salina St., Syracuse, N. Y., as distributor for the "Ampco Weld" line of resistance welding electrodes. Greer's territory is New York State except for metropolitan New York.

Broken Parts Repaired Quickly With Bridgeport's No. 192 Low Fuming Bronze Rod

Breaks in parts like these are inevitable—but in this case there was no costly delay in production or expensive replacement. Thanks to Bridgeport's No. 192 Low Fuming Bronze Rod, the castings were quickly repaired by braze-welding and put back into service good as new.

Braze-welding with No. 192 Rod is quick and easy. Its excellent "tinning" and "filling" actions make fast work of repairing broken parts or building-up worn surfaces. Welds are tough, yet ductile and machinable. No elaborate preheat and slow cooling are needed. Repairs can often be made on the spot.

Timely information on braze-welding can help you reduce costly down-time and replacements. Write for "Bronze Welding Alloys." This 24-page booklet contains descriptions of the Bridgeport bronze welding alloys and valuable tips on braze-welding. Write for your free copy on company letterhead.

"Bridgeport" BRASS CO.

BRIDGEPORT BRASS COMPANY
Bridgeport 2, Conn. Established 1865
Mills at Bridgeport, Conn., and Indianapolis, Ind.
In Canada: Noranda Copper and Brass Limited, Montreal

Bronze Welding Rod A PRODUCT OF BRIDGEPORT BRASS

ARCOS
Low Hydrogen Electrodes
Weld High Tensile Steels
• Without Preheating
• Free of Underbead Cracks

USS MAN-TEN
® United States Steel Co.

HIGH TENSILE STEEL
YOLOY
® Youngstown Sheet & Tube Co.

N-A-X
LOW-ALLOY STEELS
® Great Lakes Steel Corp.

U-S-S COR-TEN
® United States Steel Co.

AW DYNALLOY
® Alan Wood Steel Co.

MAYARI R
® Bethlehem Steel Co.

OTISCOLOY
® Jones & Laughlin Steel Corp.

HI-STEEL
® Inland Steel Co.

REPUBLIC ALDECOR
® Republic Steel Corp.

As well as other low alloy steels of similar analysis.

For more information request • Booklet—ABC's of Welding High Tensile Steels • Selector Chart 9501—Welding Trade Named Steels.

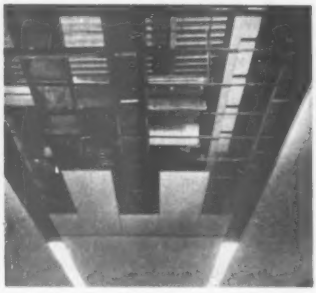
ARCOS CORPORATION 1500 South 50th St., Philadelphia 43, Penna.

for "peace of mind"

WELD WITH

ARCOS

Stainless, Low Hydrogen and Non-Ferrous Electrodes



U-SHAPED "troffer" beam carries lighting, plumbing in new building

Austin Company Saves On New "Troffer" Beams

FLUORESCENT lighting systems can be installed in industrial plants and other buildings at considerable savings with a new type of supporting structure developed by The Austin Co., Cleveland. A specially designed trough-like structure of heavy gauge sheet steel, called a "troffer" beam, serves as a structural support for the ceiling installation and also as a raceway for the fluorescent lighting fixtures. The troffer beam is fastened to the supporting truss or roof beam with clamps so that it isn't necessary to drill or punch holes in structural members.

• • •

Wm. R. Stevens Elected Welding Bureau Head

CHAIRMAN of the board of trustees of the National Certified Pipe Welding Bureau this year will be William R. Stevens of Cincinnati. Other officers are R. W. Lawinger, Chicago, vice-chairman; Wray M. Scott, Omaha, treasurer and Joseph C. Fitts, New York City, secretary.

E. P. Everhard, Chicago was elected chairman of the technical committee for the current year. Prof. Robert S. Green, Ohio State University, Columbus, O., continues as technical consultant for the board. Newest board member is Wray M. Scott, who was elected at this time.

• • •

Two Florida Distributors Merge Welding Businesses

THE Orlando Oxygen Service, Orlando, Fla., has consolidated its business with National Gases & Welding Supplies, Inc., of the same city. Name of the new firm is Florida Oxygen Service and its address is 1007 West Central Ave., Orlando.

Partners in the new firm are W. Herbert Hinely, J. Vernon Hinely and George D. Barr.

Recommend Procedure for Tractor Top Carrier Roller

AUTOMATIC rebuilding of cast steel track rollers for tractors has become increasingly popular recently (see page 26, THE WELDING ENGINEER, August, 1951). However, the best way to repair tractor top carrier rollers is by a manually applied electrode, says the Stoody Co., Whittier, Calif.

Track carrier rollers are made of cast iron, and until recently it wasn't considered practical to rebuild them by hard-facing. The special electrode recommended for the job has its alloying elements in the coating and is suitable for all-position welding. Its deposit has the following approximate analysis: chromium 4-6%, manganese 1.5%, silicon 1%, molybdenum 0.1%, carbon 0.7% and the balance iron. It has high impact strength and resistance to severe abrasion.

Tractor rollers must have high wear resistance. When tractors operate in heavy mud conditions, the rollers often "freeze" and by the time they can be freed, the track has worn a flat spot on them. Rollers rebuilt with this hard-facing electrode are said to be able to usually resist the flattening action.

• • •

Gallaway Elected President of Safety Equipment Association

THE Industrial Safety Equipment Association has re-elected Charles H. Gallaway, American Optical Co., as president. Elected to the vice-presidency was Earl H. Brooks, Safety Clothing and Equipment Co. New members of the board of trustees are Jess A. Brewer, Industrial Gloves Co., and G. M. Glidden, Acme Protection Equipment Co.

Carrying over as board members until next year are: Frank R. Davis, Jr., Davis Emergency Equipment Co., and Stanley C. Herbine, Willson Products Co. Lawrence E. Dickson, junior past president, automatically continues as a board member for another year.

Meetings of the association are held quarterly. Association headquarters are at 420 Lexington Ave., New York City 17.

• • •

Morton-Gregory Becomes Gregory Industries, Inc.

NEW corporate name for Morton-Gregory Corporation is Gregory Industries, Inc. Principal interest of the corporation is the Nelson Stud Welding Division, Lorain, O., producers of stud welding equipment and studs.

WAGNERLOY* CONSTRUCTION

DELIVERS FULL CURRENT TO ARC!

WAGNER ELECTRODE HOLDER with "COPPERHEAD" INSULATOR TIPS

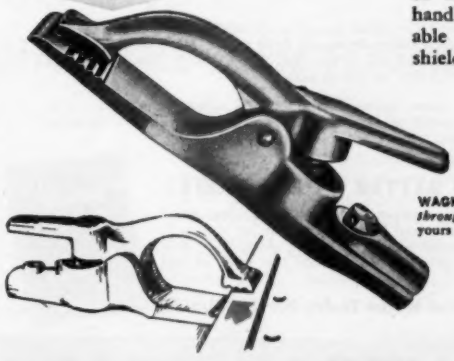
• Replacement costs slashed by tough heat-resistant insulator tips which almost double the service life of WAGNER electrode holders. Patented channel construction cools operation. Powerful coaxial springs of vanadium steel can be instantly adjusted.

STRONGER – LIGHTER – MORE PRACTICAL

* You're sure of full butt-to-jaw power when you weld with WAGNERLOY construction. This specially designed alloy, based on copper, retains most of that metal's unmatched conductivity. Yet WAGNERLOY is stronger than copper – much more resistant to intense arc tempertaures. WAGNERLOY means minimum weight, too. WAGNER'S heaviest electrode holder, for example, weighs but 23 ounces. You find WAGNERLOY only in WAGNER electrode holders and ground clamps.

WAGNER GROUND CLAMPS DIG UNDER FLAT WORK

• Specially designed broad flat base with beveled leading edge may be alternately used as plate or to ground hard-to-handle flat work. Adjustable coaxial spring fully shielded.



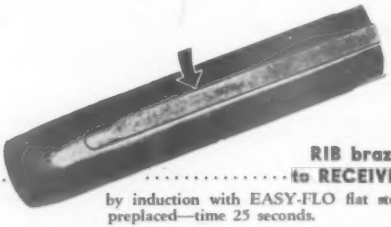
WAGNER products are sold only through authorized dealers – ask yours for a demonstration.

WAGNER MANUFACTURING CO.

230 W. 1st SOUTH ST. JACKSON, MISSOURI

EASY-FLO
HITS THE MARK
IN GUN PRODUCTION

In making this shotgun, High Standard Mfg. Co., New Haven, Conn., aimed for *fast production* and *low cost*. With EASY-FLO, the low-temperature silver brazing alloy, they scored bull's-eyes.



RIB brazed to RECEIVER

by induction with EASY-FLO flat stock preplaced—time 25 seconds.

REAR BLOCK brazed to RECEIVER

by induction with 4 pieces of EASY-FLO wire preplaced—time 28 seconds.

ALSO —ACTION BAR brazed to FOREHAND TUBE in 5 seconds.—COLLAR brazed to MAGAZINE TUBE in 5 seconds—VENTILATED RIB and COMPENSATOR joined to BARREL in 2½ minutes.

SCORE —5 clean, strong assemblies in 3 minutes total time—with a fraction of an ounce of alloy per joint and no finishing needed.

WILL *EASY-FLO* BETTER YOUR SCORE?

Will this remarkable low-temperature silver brazing alloy speed up metal joining production and bring down costs for you, as it has for hundreds of manufacturers? Without obligation, we'll send a field engineer to give you the answer. Just write or call and say when.

For the Facts in Print Write Today for Bulletin 20

HANDY & HARMAN
FOUNDED 1867 QUALITY SERVICE

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Bridgeport, Conn. • Chicago, Ill. • Los Angeles, Cal. • Providence, R. I. • Toronto, Canada
Agents in Principal Cities

Flame-Spinning Smooths Concrete Mixer Rolls

DISTORTIONS and surface imperfections in 18-gage steel bowls for concrete mixers were causing trouble. Upon being assembled they wouldn't rotate smoothly on steel or rubber friction rollers. The track around the bowls, with a maximum diameter of 23¼ in., just wasn't true.

A variation of the flame-spinning process has remedied the situation. An oxyacetylene heating head is positioned to h eat a 3-in. wide band as the bowl is spun on a mandrel at 40 rpm. After two minutes of heating, case-hardened rollers are brought to bear on the red-hot band. The external roller is fixed and the internal one is movable to expand the metal from the inside. Required surface condition is restored on the periphery and track, and the bowl is ready for long, trouble-free service.

—McGraw-Hill World News

* * *

Reynolds Takes Over Air Force Methods Plant

REYNOLDS Metals Company has taken over the management of the U. S. Air Force's Manufacturing Methods Pilot Plant at Adrian, Mich. The $20,000,000 plant is used for developing forging and extrusion techniques in aluminum and the proving of theoretical designs. The facility is available to any industry or government agency wishing to do development work on processes of either military or commercial interest. The factory contains 700,000 sq ft of space.

The equipment already in the plant includes 15 hydraulic extrusion presses, the largest of 5,500 ton capacity. Four giant forging presses are in the process of being shipped from Germany's I. G. Farben plants. The biggest has a capacity of 15,000 tons; the others are 7,000, 2,000 and 600 tons respectively.

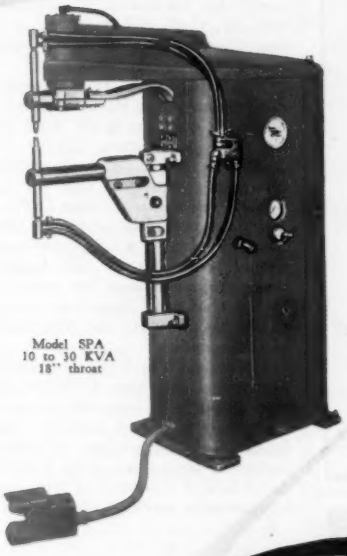
* * *

Stud Welding Franchises Issued in East, Southwest

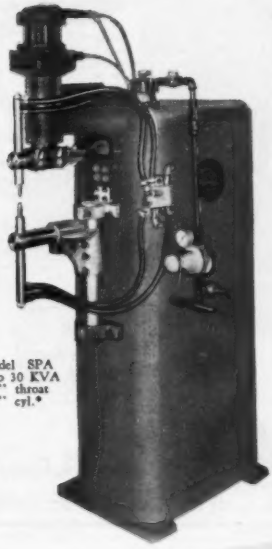
THE Nelson stud-welding method has been licensed to contractors installing corrugated asbestos, aluminum and steel roofing in the Pittsburgh and Tulsa, Oklahoma, areas. Gregory Industries, Inc., Lorain, O., owns the process.

Elwin G. Smith and Co., Pittsburgh, operates in the tri-state area embracing Pittsburgh, Charleston, W. Va., Youngstown, O., and Altoona, Pa. Braden Steel Corp., Tulsa, Okla., operates in both Oklahoma and Texas.

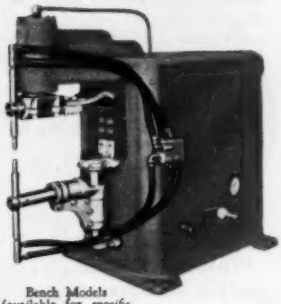
SPEED WITH ACCURACY



Model SPA
10 to 30 KVA
18" throat



Model SPA
10 to 30 KVA
12" throat
4" cyl.*



Bench Models
(available for specific requirements for bench mounting.)

MODEL SPA SERIES
10-15-20 and 30 KVA

Banner SPOT WELDERS

A BANNER Welder does your job faster — and better. Its special design and construction features raise plant production and efficiency.

ONLY BANNER OFFERS ALL THESE FEATURES . . .

★ BANNER Welders can continuously and accurately weld up to *225 spots a minute.*

★ Time tested proof of a Banner development is the unique design of ram and cylinder and the *long bearing surface of 7".*

★ Up to 7" adjustment on lower knee.

★ Heavily ribbed cast iron head, with integrally cast cylinder *provides utmost rigidity.*
Manganese Bronze piston specially equipped with 3 cast iron double seal (automotive type) rings. *Reduces friction* up to 50% thus permitting necessary follow up *after* welding cycle.

★ Pin and slot arrangement *prevents piston from turning.*

★ Piston actuated by foot switch and *solenoid operated air valve.*

★ Heavy duty selector (with contacting pads of ample cross section) provide *8 stages of heat regulation.*

★ All current carrying members are designed for *over load capacity* and made of high conductivity copper alloy.

★ Secondary and secondary pads are *water-cooled* assuring dissipation of heat in the horns and laminated shunt.

★ Frame is ¾" *boiler plate.*

Specific data sheets and catalog available. Write today!

Banner manufactures a complete line of Gun, Seam, Rocker Arm and larger Press Welders and Specials to 200 KVA. Inquiries invited.

*For special application with double acting cylinder and hand valve (for tip dressing). Also available in 10" throat.

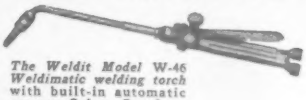
BANNER MANUFACTURING CO.
4932 NORTH 29th STREET MILWAUKEE 9, WIS.

Weldit INC SINCE 1918

TORCHES...
UNSURPASSED FOR TOP PERFORMANCE

FOR 33 years management men and welding operators combine to put the stamp of approval upon *Weldit torches* for these important reasons; superior quality of work, greater productive capacity, gas saving economy and minimum maintenance cost.

Weldit Weldimatic torches are indispensable for defense work because they will increase your production up to 148% plus an average gas saving per operator of $4.80 per day.



The Weldit Model W-46 Weldimatic welding torch with built-in automatic gasaver. *Safe — Speedy — Rugged — Light.* —

The *Famous Weldit Gasaver* Model E — The *original* gas saving unit cuts gas consumption 25 to 30%. Eliminates fire hazards and increases defense production.

Weldit Torches . . .
For The Man Who Carries The Torch.

WRITE FOR Technical Bulletins Nos. 3 and 9.

994 OAKMAN BLVD. Weldit INC SINCE 1918 DETROIT 6, MICH.

CANADIAN DISTRIBUTORS · ALLOY METAL SALES · 881 BAY ST., TORONTO 5, ONT., CANADA

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with WATCHEMOKET eye SAVERS

TUC-AWAY WELDER'S GOGGLE

There's no need to sacrifice comfort for safety. Get *both* with Tuc-Away Eye-Savers. It's the ideal flash goggle for under-helmet use and other glare and impact hazards! Light weight plastic frame and welded "telescoping" temples assure light, comfortable fit. 3 plastic change-around lenses are available to give *sure* protection from all types of eye hazards. Order from your welding (or safety) supplier or write direct.

FREE! *Send for magazine article giving impartial advice on best uses of plastic eye protection. Eye-Savers catalog also included.*

WATCHEMOKET OPTICAL CO., INC. DEPT. S, PROVIDENCE, R. I.

Producers and Originators of Practical Plastic Eye Protection

Vapor-Cooled Transformers Promise Less Weight

SAVINGS in weight of 25 to 33% are expected from a new vapor-cooled, vapor-insulated transformer being developed by Westinghouse Electric Corp. The new cooling technique utilizes the heat of vaporization of liquid fluorocarbons for cooling and the dielectric strength of fluorocarbon vapor for insulating. It originated with Dr. C. F. Hill, manager of the insulation department at the Westinghouse research laboratories.

Two experimental transformers of this type have been built and operated under the guidance of Dr. Paul Narbut of the transformer division. The first, a modified standard dry-type transformer equipped with the new cooler, delivered more than 350% of rated capacity, dissipating ten times more heat than a dry-type transformer. Although at this loading, losses and impedance are much too high for practical operation, the test results do illustrate the possibilities of such cooling.

The second transformer, a specially constructed 500 kva, 2400/240 volt model, has been operating at rated load since Jan. 1. A network transformer with this cooling will be installed on the system of the Consolidated Edison Company of New York for extensive service tests.

* * *

New Industrial Cleaner Uses Large Molecules

ACTION of new industrial cleaners developed by the Pennsylvania Salt Manufacturing Company is based on oversize micelles or groups of molecules formed by the ingredients of the cleaner. They not only dissolve water-soluble soils taken up by normal soap solutions but also water-insoluble soils which can normally be removed only by organic solvents.

Called "Solubilizing Cleaners," they are expected to be very suitable for industrial processes which often produce combinations of water-soluble and insoluble materials. The range of solvent power in the cleaners make them effective in removing buffing compounds, greases and pigmented drawing compounds.

One of the cleaners is an effective hand cleaner, with or without a water rinse; it removes imbedded grime, paint, tar or printing ink. The cleaners are clear liquids, yellow, dark brown or cherry red in color. They have a practically neutral pH, good solubility and dispersibility in water, moderately high flash point and show a high adsorption at interfaces.

Ceramic Coatings Conserve Strategic Aircraft Alloys

THIN LAYERS of ceramic compounds have recently been found to protect aircraft exhaust systems from heat and gas erosion, reports Ryan Aeronautical Company, San Diego, Calif. Not only will the exhaust assemblies last longer, but scarce strategic alloys that resist high heat and corrosion will be saved.

About 600 sets of exhaust systems for Pratt & Whitney R-2800 engines, including spares, will be coated with ceramics by Ryan. These engines power the Convair 240 and 340 transports. In addition, Boeing Airplane Company, Seattle, has ordered ceramic-coated Ryan exhaust assemblies for all its B-50 bombers and C-97 air freighter and aerial tanker planes. These planes are powered by Pratt & Whitney R-4360 28-cylinder engines.

In the jet engine field, General Electric Company has given Ryan experimental orders for ceramic coating of the transition liners and inner combustion chambers Ryan manufactures for the J-47 engine. Experimental work is being conducted with Douglas Aircraft Company and United Air Lines on ceramic coatings for DC-6 transport exhaust stack assemblies.

On the ground, Continental Motors Corporation's 825 hp engine for the General Patton tank will have ceramic coated sections on the new manifolds soon to be in production at the Ryan plant.

Pioneer work in this field dates back to the World War II when portions of more than 500 complete exhaust systems for the Douglas A-20 attack bomber were given thick porcelain enamel coatings. A low carbon steel was used then because of a critical shortage of stainless steel.

* * *

London, Ontario Weldors Choose 1951 Officers

ELECTED at the May meeting were the following officers for the 1951-52 season of the Canadian Welding Society at London, Ontario: J. W. Pawley, chairman; L. F. Pepino, vice-chairman; Dean H. Dover, secretary; Ted W. Catton, treasurer; Syd Reeve, membership; David H. Copp, publicity; Don F. McCall, program; Harry Marsh, education; Lorne McCall, public relations.

The London chapter has ten sustaining companies and 26 individual members. Newest sustaining company member is the Allen Tank & Welding Company, London. Meeting place this year will be the YMCA.

GB
SILVER BRAZING
ALLOYS and FLUX
TEAM UP TO
Save You Money!
More and more cost-conscious manufacturers are specifying GB Silver Solder and GB Flux! They have found that these two products, developed to work together, give them the best results on their low temperature brazing operations.

GB HELPS YOU CONTROL THESE COST FACTORS!

SPEED
HEATING
MATERIAL
LABOR
CLEANING
FIT-UP
PREPARATION

GB Silver Solders are available in six standard alloys—each developed to meet specific cost and production requirements. All are available in the most convenient form to meet your needs—wire coils or straight lengths, strips, sheets or formed pieces.

GB No. 50 Silver Solder, melting range 1160-1175°F
GB No. 50N Silver Solder, melting range 1240-1260°F
GB No. 45 Silver Solder, melting range 1125-1145°F
GB No. 41 Silver Solder, melting range 1125-1160°F
GB No. 35 Silver Solder, melting range 1130-1270°F
GB No. 31 Silver Solder, melting range 1130-1300°F

And, if you require a special Silver Solder, Goldsmith's Technical Service Division is ready to give you competent assistance—their recommendations will be backed by 80 years of experience in alloying and refining precious metals.

GB FLUXES

Produced under strict laboratory control, GB Fluxes are fully active, deep penetrating, stable and economical. While developed primarily for use with GB Silver Solders, they produce high quality joints with any good silver solder.

GB DATA BOOK

Here's down-to-earth information on the important phases of low temperature brazing. You can get a free copy from your GB Distributor—Write us and a copy will be forwarded to you.

GOLDSMITH BROS. SMELTING AND REFINING CO.
1304 W. 59th Street, Chicago 36, Illinois
Suppliers of Precious Metals to Industry Since 1867

Welding Training PAYS!

Let your employees learn the newest methods,

techniques and procedures in a modern, non-profit school dedicated to advancing the welding industry.

Quick "Brush-up" courses to bring student up-to-date on any type of welding.

Complete 16-week course qualifies student for any and all welding jobs. Every phase of welding is covered thoroughly.

We can train your employees, individually or in groups, to do any specific job or any type welding required.

Students learn quickly and easily at the Hobart Welding School. Equipment is the latest and best . . . training is thorough and complete . . . instructors experienced in both practical work and teaching.

HOBART Welding School
BOX U-911, TROY, OHIO
Write Today for Complete Information

Small group instruction plays vital part in Hobart training.

Co-operating with HOBART BROS. CO. *"One of the world's largest builders of arc welders"*

PRECISION GEARING COMMANDS PERFECT
AUTOMATIC WELDING

Precision cut gears rotate and tilt WELDMORE work table smoothly for *optimum* automatic welding. Maximum contact between hardened gears results in nearly zero backlash.

All awkward position welding made easy with WELDMORE'S *push button* positioning. Work table rotates 360°—adjusts 12" vertically—tilts 135° included angle, with safety limit stops. Every moving part heavily protected.

WELDMORE
The **POSITIONER**
with Production in Mind

PANDJIRIS WELDMENT CO.

5151 NORTHRUP—ST. LOUIS 10, MO.

WELDING GANTRIES—WALL TRACK PLANOGRAPH WELD ARMS—TURNING ROLLS—TANK JIGS—TUBE BENDERS—HYDRAULIC COIL MANDRELS—SPECIAL POWER WELD TOOLS

New Film Shows Induction Heating Uses

A few of the thousands of uses for induction heat in industry are presented in a new 16 mm sound color film released by Allis-Chalmers Manufacturing Co.

Production scenes in the film include brazing fittings into refrigerator compressor housings, heating of steel strip for baby buggy springs, annealing of automobile brake arms and hardening of eight localized areas of a rocker arm shaft.

Running time of the film is 20 minutes. Prints are available upon request to the advertising and industrial press department, general machinery division, Allis-Chalmers Mfg. Co., Milwaukee.

* * *

Montreal Welding Officers Elected for new Season

Taking over the leadership of the Montreal chapter of the Canadian Welding Society in October will be the following slate, elected last spring. They are: Claude Clermont, chairman; J. Taylor, vice-chairman; W. Holcroft, treasurer; Yves Lanouette, secretary; F. S. Higgs, program; Fred Schneider and E. Burns, membership; Andre Marchand, publicity; Stan Pyves and Larry Weston, attendance; R. Doehler, projectionist and J. S. Johnston, past chairman.

The Montreal chapter membership now stands at 27 sustaining companies and 110 individual members.

* * *

North Carolina Distributor Moves into New Quarters

National Welders Supply Co., Charlotte, North Carolina, has occupied its newly built office and plant building. There is 7,000 sq ft of floor area and 9,000 sq ft of platform area.

James A. Turner, Jr., is founder and president of the company, organized in 1939. National produces commercial acetylene and oxygen and distributes both oxyacetylene and arc welding equipment.

* * *

Eight Active Chapters in Canadian Welding Society

Growing interest in welding matters in Canada is reflected in the expanding Canadian Welding Society, now operating eight active chapters in Toronto, Montreal, Hamilton, Kitchener, Welland, London, Winnipeg and Vancouver.

New programs in each chapter commence in October. Membership is $5 per year. Information may be obtained by writing to the national secretary, W. T. Cherry, 200 Adelaide St. West, Toronto, Ont.

Keep costs down by saving valuable flux

KENT

SUCTION CLEANER for Flux Recovery

PAYS FOR ITSELF by salvaging valuable flux . . . and it's easily adaptable to any type of welding application. Unused flux and small fused particles from the weld are picked up and screened . . . dust is removed . . . and the clean flux is deposited in the lower tank to be re-used as needed!

DEPENDABILITY is built into every KENT product . . . and 38 years of experience in the vacuum field stands behind it. The KENT Suction Cleaner for Flux Recovery is engineered for service . . . and built to last!

Full information is available upon request—no obligation!

KENT

Commercial Vacuum Cleaners • Floor Machines • Furnace Cleaners • Dry Floor Scrubbing Machines

THE KENT COMPANY, Inc.

436 Canal Street • Rome, N. Y.

About People

DAVID R. WARNER is the new near-Western district sales manager for Miller Electric Manufacturing Co., Appleton, Wis. He will cover the states of Nebraska, Kansas, western South Dakota, Wyoming, Colorado and western Texas. He has been in the welding field since 1936.

* * *

R. S. MCCRACKEN, JR., of R. S. McCracken & Sons, Inc., Philadelphia, is the new president of the National Welding Supply Association. Mr. McCracken was formerly regional vice-president in charge of the eastern district of the association. The late Mr. McCracken, Sr., was also active in NWSA.

* * *

RAY F. SPARROW has been elected executive vice-president of P. R. Mallory & Co., Inc., Indianapolis. He has been vice-president in charge of sales for many years, having joined Mallory in 1931 in that position. HAROLD C. BUELL, sales manager since 1945, has been promoted to vice-president in charge of sales to succeed Mr. Sparrow. JAMES L. WELLINGER has been elected comptroller.

* * *

JOHN ("JACK") FOX has joined The Pandjiris Weldment Co., St. Louis, as sales manager of the Weldmore positioner line. He was formerly with Machinery & Welder Corp., St. Louis.

* * *

S. D. FLINN has been elected director and secretary of United States Steel Supply company, warehousing subsidiary of U. S. Steel.

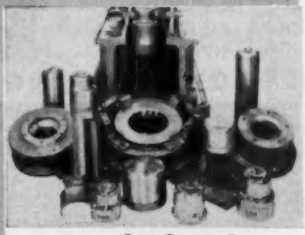
* * *

WILLIAM A. HASELTINE, of the J. E. Haseltine Co., Portland, Ore., has been elected president of the National Supply and Machinery Distributors Association.

* * *

R. EDWARD STEIN has been elected vice-president in charge of manufacturing of Lewis Welding & Engineering Corp., Cleveland. GLENN JOHNSON has been appointed plant manager of the welding division.

300% more life from dies



overlaid with Ampco Bronze Electrodes

Production was increased from 3600 deep-drawn cases (for sealed refrigeration units) to 15,000 cases, when Industrial Stamping and Manufacturing Co. of Detroit overlaid their steel punches and die-rings with Ampco Bronze electrodes.

Big Savings in Press Room

Downtime was greatly reduced and operating time increased. Efficiency was upped 15% because presses did not have to be stopped to hone and polish dies or change tools in the middle of a run. Average production was increased to 15,000 units before appreciable signs of wear on the dies.

Put Ampco Bronze electrodes to work for you. Enjoy longer production runs, less downtime, lower costs.

Industrial Stamping and Mfg. Co. personnel inspecting punch overlaid with Ampco Bronze electrodes.

W-119

AMPCO

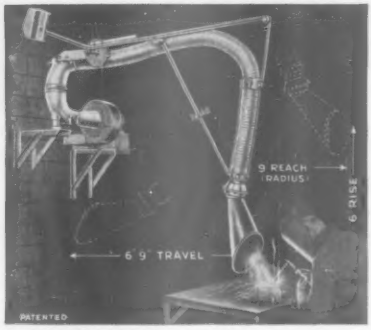
Ampco Metal, Inc.

Milwaukee 46, Wis.

It's Production-Wise to Ampco-ize!

RUEMELIN Fume Collectors

Welding without ventilation. Note smoke and gas clouds.



(Right) Welding with Ruemelin Fume Collector.

REMOVE WELDING FUMES at the Source!

Ruemelin Fume Collectors remove smoke, gas and welding heat. Keep the shop air clean. Efficient and practical. Maximum coverage in welding areas. Your welders work better with this equipment in use. Write for bulletin 37-D describing all models.

Long reach collector extends working range of hood to 15 ft. or 18 ft. operating radius. Double swivel permits hood to work in 360° circle for full coverage.

RUEMELIN MFG. CO.

Manufacturers and Engineers SAND BLAST AND DUST COLLECTING EQUIPMENT
3880 NORTH PALMER STREET • MILWAUKEE 12, WISCONSIN, U. S. A.

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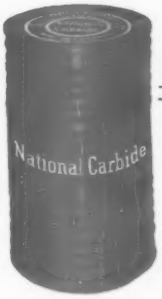
National
Carbide

EFFICIENT
ECONOMICAL
DEPENDABLE
for
Welding & Cutting
SPECIFY



NATIONAL CARBIDE IN THE RED DRUM

Write us for information as to nearest available stock.

NATIONAL CARBIDE COMPANY

A Division of Air Reduction Company, Inc.
60 E. 42nd St., New York 17, N. Y.

RUSSELL J. WOLF, formerly assistant to the president of M. W. Kellogg Co., has been named vice-president in charge of sales. He will also continue to supervise Canadian projects as a vice-president of Canadian Kellogg Co. Ltd. DONALD W. CHAMPLIN is the new vice-president in charge of Kellogg's manufacturing in Jersey City.

* * *

M. W. TOWNSEND has taken over direction of sales for Handy & Harman for all products in the industrial and arts fields. For the past five years he has been assistant to the vice president in charge of sales. His office will be in New York.

* * *

HAROLD A. MILLER has been appointed general staff manager, general sales department, United States Steel Supply company.

* * *

M. B. GARBER, director of sales of The Thew Shovel Co., Lorain, O., has been appointed director of the construction machinery division of N.P.A. in Washington.

* * *

HARRY W. PIERCE, president of the American Welding Society, has been elected to the position of vice-president in charge of design and procurement at New York Shipbuilding Corp., Camden, N. J. Long active in Welding Society affairs, he is also well-known in the shipbuilding industry.

* * *

WILLIAM DAVIS has been hired by Pandjiris Weldment Co., St. Louis, Mo., as cost accountant and adviser on a profit-sharing plan for Pandjiris employees.

* * *

Officers of Flori Pipe Company, St. Louis, Mo., are E. M. FLORI, president, ROBERT D. FLORI, vice-president and general manager; CHARLES J. DENNY, vice-president and treasurer and H. G. SCHOENINGER, vice-president and purchasing agent. Superintendent is LLOYD BLUMENSTOCK and foreman is GEORGE BROOKS.

CHARLES A. METZ joined Banner Mfg. Co., Milwaukee, recently to assist in service, application and general sales activities and will also serve as sales manager.

* * *

HARRY T. BLANDFORD has been appointed chief cost accountant of The Liquid Carbonic Corp., Chicago.

* * *

MITCHELL A. KAPLAND, vice president, has been placed in charge of sales activities for all four divisions of Cummins-Chicago Corp., Chicago.

Died . . .

WILLIAM W. REDDIE, 62, assistant to the manager of the welding department of Westinghouse Electric Corp., was drowned in a boating accident on the Niagara River on July 27. He was a long-time member of the American Welding Society manufacturers committee and very active in AWS activities in the Pittsburgh and Buffalo, N.Y., sections.

* * *

WILLIAM C. JOHNSON, 49, executive vice president of Allis-Chalmers Mfg. Co., Milwaukee, passed away on July 26 of a heart attack. He started with Allis-Chalmers in 1924 as a machinist helper. He was appointed executive vice-president in charge of both general machinery and tractor divisions in February, 1951.

* * *

WILLIAM W. BARNES, retired Philadelphia manager of the Air Reduction Sales Co., died July 24 at the age of 76. He was with the Davis-Bournonville Company and Air Reduction more than 30 years and was one of the charter members of the Philadelphia section of the American Welding Society.

* * *

ALFRED G. YORK, director and vice-president of the Watson-Stillman Co., Roselle, N.J., died on July 22. He was on the National Board for the Standardization of Fittings and was a member of the Manufacturer Standardization Society of the valve and fittings industry.

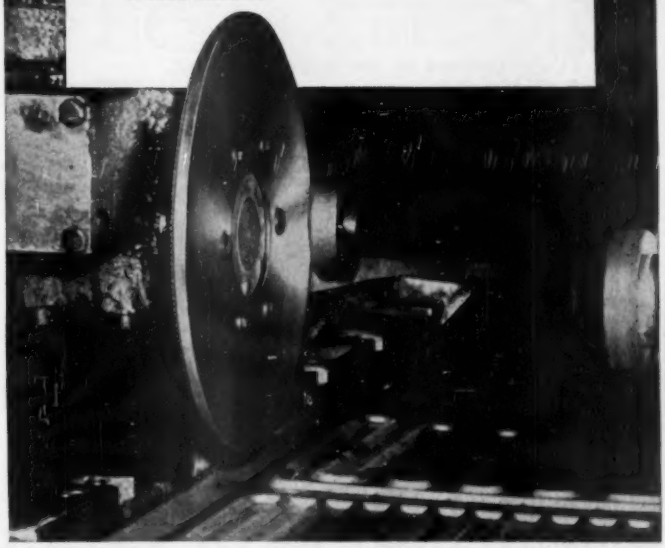
* * *

ROBERT I. INGALLS, SR., president and chairman of the board of the Ingalls Iron Works Co., died July 12 in Birmingham, Ala. A pioneer in all-welded ship construction, he was in charge of the shipyard in Chickasaw, Ala., where the first all-welded vessel was built in 1931. He also pioneered in all-welded fabrication of steel structures for office buildings, factories and hospitals.

BERYLCO 50

RESISTANCE WELDING WHEELS USED BY NORGE

The Norge Division of Borg-Warner, maker of a famous line of refrigerators, employs Berylco 50 for its RWMA Class 3 seam-welding applications. On the evaporator welder, Berylco wheels give long service in joining 18-8 stainless steel, .027" thick. On the special 6-head welders which fabricate the inner box of the refrigerator from 20 gauge steel, both wheels and spline bars are made of Berylco 50. In this case, the spline bar serves as a fixture as well as a back-up bar. Berylco 50 plays an important part in the continuous high speed production demanded of these machines.



A big advantage of Berylco welding wheels, made of rolled stock, is their more uniform hardness, which prevents uneven wear and insures low maintenance with less down-time. It will pay you to consider Berylco 50 when selecting a resistance welding material.

BERYLCO BERYLLIUM COPPER IS AVAILABLE IN ROD AND BAR STOCK AND IN STANDARD SIZE WHEELS.

BERYLCO THE BERYLLIUM CORPORATION

Dept. I • READING 13, PENNA.

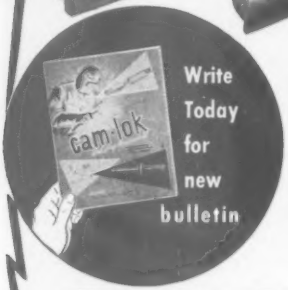
New York • Springfield, Mass. • Cleveland • Dayton • Detroit • Chicago • Minneapolis • St. Louis • Seattle • San Francisco • Los Angeles

Representatives in principal world-trade centers

This pair's hard to beat

cam-lok electrode holder

Welders everywhere will welcome this light weight, well-balanced electrode holder. Lever is in line with jaws making hard to get to spots accessible. Parallel jaws provide greater gripping pressure than any other holder. Fully insulated with the latest in tough, lasting materials, heat-proof and break-proof.



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Make full use of the 4 famous features of "York's 77".
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1 Fear of overheating can be forgotten.
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4 Deteriorated cast iron can always be welded successfully with "York's 77".

YORK ENGINEERING COMPANY

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30 YEARS AGO

(From THE WELDING ENGINEER of Sept., 1921)

WELDED buildings are much closer to being realized now. The New York Bureau of Buildings has recently approved a welded structure in New York City. Trusses are designed for a live weight of 40 lb per sq ft, each truss supporting a panel of 800 sq ft.

—30 YEARS AGO—

SALVAGING electrode stubs is no problem for a weldor working at the Locomotive Stoker Co., Pittsburgh. He keeps a 1-in. board with a number of holes in it on his workpiece. After using up most of the electrode he sticks the stub in one of the holes. A new electrode is put in the holder and the stub picked up by touching it with the end of the new electrode.

—30 YEARS AGO—

BUSINESS is coming back to "normal" again, write correspondents to THE WELDING ENGINEER. Once again, it takes real management to conduct a business at a profit and real salesmanship to produce orders.

—30 YEARS AGO—

YOU can learn expert oxyacetylene welding and auto radiator repairing in your own shop by paying an advertiser in THE WELDING ENGINEER 50% of the fee from such jobs plus $100 and traveling expenses.

—30 YEARS AGO—

SIESTA time in Honduras with its boiling 120-deg temperatures aided a recent oxyacetylene repair of sugar mill machinery there. A wood and coke preheating fire was started at noon and kept under the fractured castings until 3 p.m. with the blistering sun doing its best to keep things hot. Cool breezes generally come up between 3 and 4 p.m. when a weldor can stand to commence working again.

—30 YEARS AGO—

THERMIT-welded connections on 15 miles of extra heavy steel and wrought iron pipe for refrigerator installations have proved out for the Linde Canadian Refrigeration Co. Ltd., Montreal, Canada.

—30 YEARS AGO—

SCRAPPING of six 12-in. artillery mortar carriages at Fort Wright, Fishers Island in Long Island Sound, was considerably speeded by flame cutting. First method tried by the scrap contractor was dynamite blasting, but there was too much danger to nearby installations.

Book Reviews

Scientific French

SCIENCE FRENCH COURSE. *By C. W. Paget Moffatt. Revised by Noel Corcoran. Published by The Chemical Publishing Co., Inc., New York, 1951. Cloth, 4½ by 7 in. 332 pages. Price $4.75.*

This book is a self-teaching manual for learning how to read and understand scientific French within a few weeks. A minimum of well selected grammatical rules provides a solid backbone for the body of knowledge. An outstanding advantage of the book is that no previous knowledge of the language is needed.

The major part of the book is devoted to articles taken from every important branch of science: physics, chemistry, mathematics, botany, geology, geography, physiology, psychology, anthropology and military science. Reading selections have been abstracted from the most recent technical and scientific literature. A detailed alphabetical vocabulary eliminates thumbing through a dictionary.

* * *

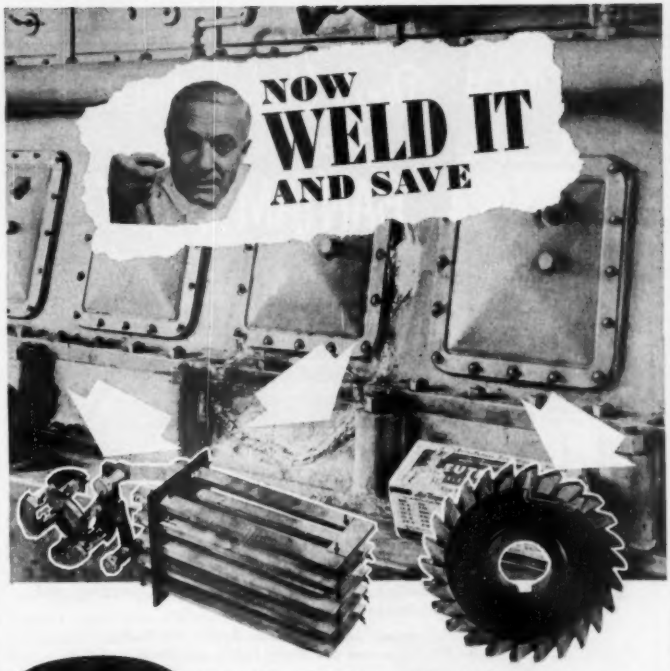
Maintenance

TECHNIQUES OF PLANT MAINTENANCE —1951. *Published by Clapp & Poliak, Inc., New York, 1951. Cloth 8½ x 11 in., 223 pages. Price $6.*

The Technique of Plant Maintenance—1951 is the compiled proceedings of the Plant Maintenance Conference held during the Plant Maintenance Show in Cleveland last January. Forty technical papers with accompanying tables, diagrams, graphs, and illustrations are presented here. On specific points there are 544 questions with answers given by the speakers at the conference.

Subjects covered include preventive maintenance, inspection procedures and frequencies, records and reports, training personnel for maintenance, organization and management for maintenance, maintenance costs, incentive payment of maintenance workers, planning and scheduling maintenance operations, applied lubrication in industry, housekeeping, painting and decorating, floors and standards of sanitation.

Discussions tell all about maintenance of electrical, power and heating equipment; problems of the small plant; selection and maintenance of lighting equipment; maintenance in chemical, paper and paper products, food processing and metal working plants.



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	SILVER CONTENT	MELTING POINT	FLOW POINT
SILVALOY 50	50%	1160 F	1175 F
SILVALOY 45	45%	1125 F	1145 F
SILVALOY 40	40%	1135 F	1205 F
SILVALOY 35	35%	1125 F	1295 F
SILVALOY 20	20%	1430 F	1500 F
SILVALOY 15	15%	1185 F	1280 F
SILVALOY 503	50%	1195 F	1270 F

1200 All-Purpose Flux—for use on all metals. No. 1200 Flux readily dissolves oxides during brazing operations and aids in the flowing of the alloy. Meets all government specifications.

1100 Low Temperature Flux—superior where exceptionally clean surfaces on copper or copper alloys are required at lower temperatures.

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Oxy-acetelyne welding rods and flux for cast iron, steel, aluminum, brass, copper, bronze, nickel, monel and inconel.

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Metals

THE STRUCTURE AND MECHANICAL PROPERTIES OF METALS. *By Bruce Chalmers. Published by John Wiley & Sons, Inc. New York, 1951. Cloth, 5½ by 8½ in., 132 pages. Price $3.50.*

This is the second volume in a series of monographs published under the authority of the Royal Aeronautical Society. Its object is to provide the simplest possible picture of the structures of various metals and alloys with an explanation of the relation to mechanical properties.

Many of the finer points of certain subjects have been glossed over in avoiding mathematical considerations. This was necessary to avoid outreaching of some readers.

Six chapters treat the structure of pure metals, structure of alloys, effects of distortion on structure, effects of heat treatment, termination of structures and mechanical properties and their dependence on structures. The author has assumed that his readers have an elementary general background in physics and chemistry as well as a knowledge of common engineering terms.

• • •

Galvanizing

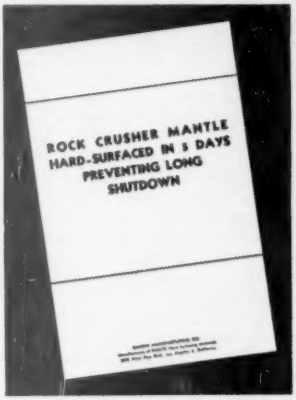
GALVANIZING (HOT DIP), *Third Edition. By Heinz Bablik. Translated by Clyde A. Bentley. Published by John Wiley & Sons, Inc., New York, 1951. Cloth, 5 by 8 in., 502 pages. Price $10.*

Well qualified to write this volume, Mr. Bablik is a professor in the Technical University of Vienna, Austria and also the manager of his own galvanizing plant. He offers the reader both practical and theoretical views on pickling, fluxes, scale and galvanizing. A brief reference on the welding of galvanized materials is presented.

Despite the author's admitted intention to omit an index, his book would be more helpful with one.

"It is our new welding positioner!"

How to Use WELDING for EQUIPMENT MAINTENANCE



This bulletin describes exactly how to reclaim worn crusher mantles. It shows step by step how one company, using the new Ranite B-X Rod, prevented a long shut-down at only a fraction of replacement costs.

A check-up of your own equipment maintenance requirements probably will reveal many applications for hard-surfacing. You can restore your equipment to its original or greater strength and efficiency, save much-needed metals for other uses and eliminate long and costly delays in purchasing new equipment or parts.

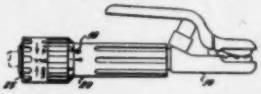
Write for your copy of this bulletin today.

RANKIN
Manufacturing Company
3072 West Pico Blvd.
Los Angeles 6, Calif.

From the Patent Office

Control on Electrode Holder

2,558,083. LAWRENCE O. GREEN, Cincinnati. Assigned to The Foster Transformer Co., Cincinnati. Filed Nov. 26, 1949. Granted June 26, 1951.

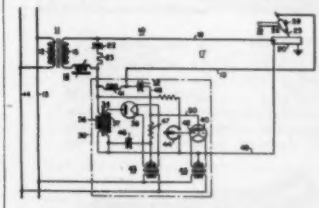


Patent pertains to a device for use with a welding electrode holder. It has an axial welding cable passage and has means at one end for receiving an electrode holder. A rotatable sleeve on the handle member is adjacent the other end of it. Two sets of contact elements are within the handle members. Contactors are secured to the rotatable sleeve. There are means to provide three positions for the sleeve, in one of which the contactors makes contact with one of the sets of contact elements. In another, the contactors make contact with neither of the sets of contact elements. In a third the contactors make contact with the other of the sets of contact elements.

* * *

Stabilizer for Arc Welding

2,558,102. WILLIAM L. ROBERTS, Pittsburgh. Assigned to Westinghouse Electric Corp., East Pittsburgh, Pa. Filed June 11, 1949. Granted June 26, 1951.



Newly patented stabilizing system for an arc welding circuit includes an energy storage device hooked into the circuit. An additional circuit means includes a valve device connected to provide a discharge circuit for the energy storage device at predetermined timed intervals to produce impulses in the arc circuit.

THE ARC-FIT PROCESS
Patented

Tube notched with special ARC-FIT
Angular notch on tubular member.
Square tube notched to fit square pipe.
Angle joint on two pipes.
"V" notch on end of Tubular member.
Pipe Notched with deep slot.
"T" joint on tube or pipe.
Angle Iron notched to fit pipe.

TOPS IN SHOP EFFICIENCY

5 seconds to notch Tubing and Pipe Ends

The answer to many problems confronting large and small shop owners. No shop can afford to be without the ARC-FIT—no matter how large or how small. Manual or power operated—fits the ARC-FIT hand press or any standard power press.

ARC-FIT is a patented precision-built shearing tool which prepares the ends of tubing or pipe to produce welded or brazed tubular "T" or angle joints. ARC-FIT will not deform the tube or pipe and no further finishing is required—no sawing, cutting, or removing sections with milling cutters. Our literature gives many fine points on operation, construction, and application—send for it today—also write for quotations.

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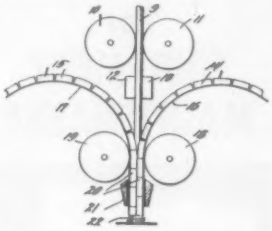
AMERICAN INDUSTRIAL SAFETY EQUIPMENT COMPANY

3503 Lakeside Avenue Cleveland 14, Ohio

DIVISION OF THE BURDETT OXYGEN COMPANY • CLEVELAND, OHIO

Automatic Arc Welding

2,562,133. WILLIBALD SENFT, Wiez, Austria, assigned to Elin Aktiengesellschaft for elektrische Industrie, Vienna. Filed Dec. 12, 1949. Granted July 24, 1951.

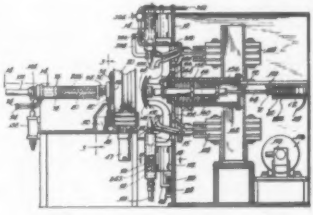


Patent covers a method of automatic arc welding in which a bare electrode wire is fed to a welding head. The wire is covered with a special shaped flux (14 and 15 in illustration above) before it reaches the welding arc, however. The flux is fed in the form of ready-shaped rigid pieces of predetermined short length pliably connected with each other so as to build up rows. The rows are assembled around the wire leaving a space inside larger than the wire itself. The rows of flux are fastened to each other and fed to the arc by a different mechanism than that feeding the electrode wire.

* * *

Wheel Welding Machine

2,558,005. MARIO M. SCIAKY, Chicago. Assigned to Welding Research, Inc., Chicago. Filed Aug. 13, 1947. Granted June 26, 1951.



Patent covers a welder having support means for a wheel to be welded. The welder provides for shifting the workpiece and electrode relatively into contact, after which welding current joins the two pieces. There are pressure means for applying force to the workpiece to effect the separation of the weld. Movement of the force beyond a predetermined position is blocked by the weld. Controls on the machine are actuated by the pressure device moving beyond such a position. Thereby, the control is actuated upon the insufficiency of the weld.

IVAN is watching you

IVAN is a dyed-in-the-wool Communist. There are only 6 million party members like him in all Russia, yet these Communist brass-hats enforce the iron dictatorship of the Kremlin over *200 million* Russians.

He's sold to the hilt on Red ideas. Which means he's out to get you. He believes it's either you or him . . . that the world is too small for both.

Ivan is working hard to beat you down. He has a big head start.

Right now he's got you in a bad spot.

Ivan is afraid of only one thing.

He fears your ability to out-produce him in guns, tanks, planes.

Frankly, he doesn't think you value your free system enough to do it . . . to make willingly the sacrifices he has squeezed out of the Russians.

But he's wrong!

Because you and all of us have set out to build more and better weapons—to do it faster all the time.

We must use every bit of know-how and inventive skill we have to improve our machines and methods—to turn out more and more for every hour we work. Only in this way can we become militarily strong.

But we've got to supply essential civilian needs as well. We can't allow needless shortages to take prices skyrocketing and lower the value of our dollar.

Sure, that means sacrifices for everybody. But doing this double job well is the only sure way to stop Ivan in his tracks—and to save the freedoms which are ours and which he has never known.

FREE . . . this important booklet tells you how our American System Grew Great

How Americans developed better machines, power and skills to build a great nation . . . Why we have been able to produce constantly more per hour . . . How this has given us the world's highest living standard.

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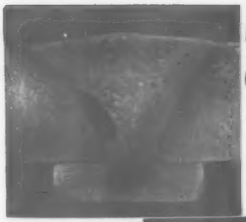
THE STRONGER WE GROW



For Slag-Free Welds and Complete Fusion

Clean with

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CHIPPING HAMMERS

Note above how improper cleaning has left slag in the seam, resulting in poor fusion.

Note the complete fusion and good penetration which result when a weld is properly cleaned.

CMD TYPE CB HAMMER
A favorite for many years, this hammer with wood handle is 3 tools in one — drift, chisel and wire brush.

Experienced weldors know that to have strong welds all slag must be removed after laying each bead. For this job many prefer a CMD Tri-Purpose Chipping Hammer such as the CB shown here or the EB or FB which have steel handles. Ask your dealer to show you the complete CMD line.

Write for descriptive circular W-9 and FREE 16 page Booklet "How to Clean Welds".

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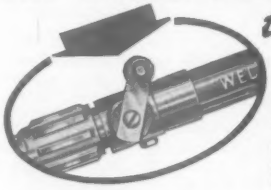
for Mass Production Welding

there's no torch like the



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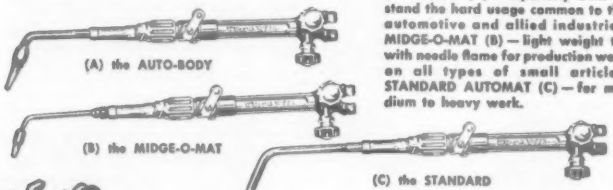
The famous MECO "On-Off" Action (above) allows a tiny pilot light to burn at the tip with the action in the "off" position. At a touch it flashes to full production flame. Action tested over 200,000 times without appreciable sign of wear.

For mass production there is no such thing as a good all-round torch. Time and motion studies have proved that for efficient production welding, the torch used must be fitted to its particular job. The Meco AUTOMAT family — embodying the famous MECO "On-Off" action (oval), is perfectly suited to the start and stop welding so common to production. The importance of this time saving feature to mass production work is apparent. Beyond this, each member of this family has built-in features perfectly suiting it to its own particular class of welding.

AUTOBODY (A) — especially built to stand the hard usage common to the automotive and allied industries. MIDGE-O-MAT (B) — light weight tip with needle flame for production work on all types of small articles. STANDARD AUTOMAT (C) — for medium to heavy work.



(A) the AUTO-BODY

(B) the MIDGE-O-MAT

(C) the STANDARD

Meco

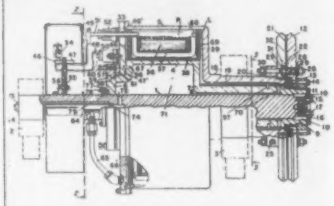
SEND FOR NEW MECO CATALOG NO. 130 TODAY!

Modern Engineering CO., Inc.

3411 PINE BLVD. ST. LOUIS 3, MO.

Rotary Welding Transformer

2,561,739. THOMAS M. HUNTER, Short Hills, N.J. Filed March 19, 1947. Granted July 24, 1951.

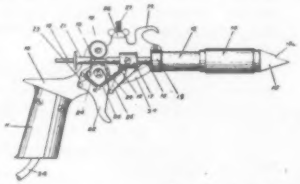


Newly patented structure for a rotary welding transformer includes a shaft with supports for it and a secondary winding with inner and outer cylindrical shaped parts. The inner part is spaced near one end a substantial distance from the shaft so as to form a cooling chamber. An annular flange at this end engages the shaft for a support. The inner and outer parts are joined at this end by a removable closure plate of current conducting material. Both parts have concentric projecting ends insulated from each other and positioned relatively close to the shaft. The inner projecting end has a support on the extremity of the shaft. Each projecting end has an electrode disc fastened to it in co-operative relationship. A primary winding and core are positioned as a readily removable unit.

• • •

Automatic Soldering Iron

2,558,009. THOMAS ALBERT SMOKE, Whitesville-Lakewood, N.J. Filed Sept. 4, 1945. Granted June 26, 1951.



Patent covers a soldering iron having a slotted frame with a roller on it. There are means for rotating the roller. A compression-feed roller assembly is comprised of an adjustable screw carried slidably in the frame. A compression arm is secured rotatably at one end of the frame and to the screw. A compression spring is carried on the screw so that it bears against the arm and the frame. A pin is carried on the other end of the arm. A compression feed roller is mounted rotatably on the pin, its movement being limited by the slot to movement into non-contiguous proximity to the first roller. It is adapted to bear on wire solder on the first roller.

Method of Welding Wire

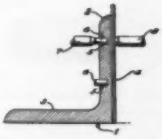
2,560,678. JOHN R. WIRT, Anderson, Ind. Assigned to General Motors Corp., Detroit. Filed July 8, 1949. Granted July 17, 1951.

Patent refers to a method of uniting a wire with another electrically conducting member. It comprises supporting a wire of substantial diameter and the member between electrodes connected with a current source. One of the electrodes has an electrical connection with the member and the other electrode, which is movable, has a surface making an acute angle with the wire along its longitudinal direction. The thickness of the wire is reduced and the wire is simultaneously spread into a larger area contact surface by causing the moving electrode to squeeze the wire while current is passing. The wire portion providing the union between the wire and the member is of wedge-like formation tapering from full diameter to a thin edge and spreads out to increase the area of the bond. The unattached wire immediately next to the wedge remains at full diameter.

* * *

Spot Welding Heavy Sections

2,559,483. ROBERT WALSH, Wilmington, Del. Assigned to American Car and Foundry Co., New York City. Filed July 24, 1948. Granted July 3, 1951.



Patent covers the method of preparing and spot welding two metallic members, one of which is so thick that an excessive current would be required to form a satisfactory nugget between the members. Method includes reducing the thickness of the larger member by making a depression in it so the zone to be welded will permit passage of a minimum welding current to form a good nugget. Metal of a lower electrical resistance than the parent metal is inserted into the hole, as at bottom in illustration above. Welding electrodes are then applied to the inserted metal and the other workpiece (top in above drawing) to weld the two members together. The minimum heat generated is not enough to cause any noticeable distortion.

Tippy Says: . . . HELEN OF TROY'S FOES WERE GULLIBLE JOE'S, BUT WHAT WAS WELDED NOBODY KNOWS !

Tippy Says: . . . Take a tip, try TIPALOY!

You have to hand it to Helen's boy friend, he certainly adapted himself to the situation. The same goes for TIPALOY Resistance Welding Electrodes . . . They produce high quality work . . . faster with less mushrooming . . . less redressing and greater current density, cut production costs yet cost no more than the ordinary electrode!

Write today for test samples and "the story of STRAIGHT LINE conductivity!"

Tipaloy INC. 1435 EAST MILWAUKEE DETROIT 11, MICHIGAN

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You can increase a Welder's output up to 30% with a $17.00 investment

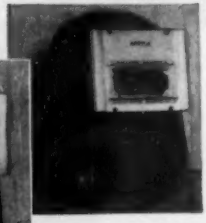
with the Argyle "QUIK-LIFT" WINDOW

The greatest improvement in welding technique in years! The Argyle "QUIK-LIFT" WINDOW makes it unnecessary to throw back the hood to change welding rod or to position small pieces for welding . . . gives instant inspection THROUGH the hood. A slight puff of air into the built-in mouthpiece raises the smoked glass . . . a slight intake through the mouthpiece lowers it.

TAKES THE WELDER OUT OF THE DARK

. . . increases his efficiency up to 30%. The Argyle "QUIK-LIFT" WINDOW fits any hood and doesn't affect the flexibility of the hood. Light weight—built of aluminum. Easily installed. Order from your dealer or direct—only $17.00 postpaid.

SMOKED GLASS DOWN . . . at the instant welder is ready to resume welding. Easily operated—welder exhales into mouthpiece to move smoked glass up . . . inhales to close it. Simple, fast efficient. PATENT PENDING.



SMOKED GLASS UP . . . welder ready to change rod or position small piece for welding. Note he has instant, clear vision through protective clear glass right up to the instant he starts to weld again.

Fully Guaranteed Send Today

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COLCHESTER, ILLINOIS

Send me _____ Argyle "QUIK-LIFT" WINDOWS.
I enclose $_____ ☐ Check ☐ Money Order
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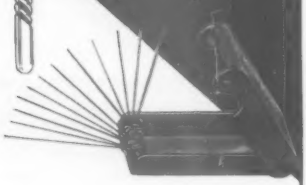
CITY _____ STATE _____

TIME is MONEY

and THERMACOTE PRODUCTS SAVE BOTH

THERMO Spiral TIP CLEANERS

are guaranteed unbreakable. They do a cleaner, smoother job because the new spiral design prevents carbon and slag from jamming in the orifice and eliminates breaking of the cleaner when cleaning tip.



TRIPLE DUTY COVER LENS

are guaranteed to outlast any lens at any price. They provide clearer vision, eliminate eye strain.

KORNER KLAMP

PAY FOR THEMSELVES EVERY TIME USED

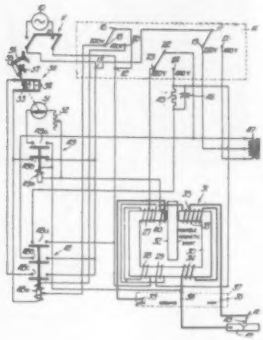
because a perfect 90° angle is assured every time when welding 2 pieces and spoilage is eliminated.

THERMACOTE CO.

NEWARK CHICAGO LOS ANGELES

A-C Welding System

2,555,481. DEAN C. GIRARD, San Leandro, Calif. Assigned by mesne assignments, to National Cylinder Gas Co. Filed Oct. 22, 1949. Granted June 5, 1951.



Newly patented arc welding system for an a-c source includes a line contactor for variable connecting the primary to the source. A relatively high or low open circuit voltage is thus induced in the secondary. A control relay for the line connector is connected to be responsive to the induced voltage. It will pick up upon application of the high open circuit voltage and will remain so on low open circuit voltage. It will drop out on completion of the welding circuit and will stay out during welding. A time delay device is connected to be responsive to the picking up of the control relay after welding ceases. It will operate the line contactor a certain time thereafter so that the welding circuit is energized with low open circuit voltage.

"None of your new-fangled branding ideas!"

ANTI-BORAX WELDING COMPOUNDS and FLUXES for FORGE WELDING and OXY-ACETYLENE WELDING AND BRAZING

Practically every metal fabricating plant in the country can profit by using ANTI-BORAX Welding Compounds. Whether they are used for actual production work, for making special tools, or for general repair work they will find—as so many other like plants have found—that these products cut the cost of these important operations. ANTI-BORAX Flux and Welding Compounds, though very important, cost very little in comparison to the fine job they do. All ANTI-BORAX Products are *Guaranteed*. Send for descriptive circulars and *free sample*.

ANTI-BORAX COMPOUND CO., Inc.
FORT WAYNE, INDIANA

TWECO TERMINAL CONNECTORS for Welding Machines

Bolt directly to positive and negative welder studs. Provide easy cable switch to reverse polarity. Simple cable disconnect for quick "Jump-In" of additional cable.

3 Sizes for cables #6 through 4/0

The male plug of TWECO "Sol-Con" and "Mec-Con" Cable Connectors connect with TWECO Terminal Connectors. Sol-Con and Mec-Con Cable Connectors are COMPANION ITEMS.

Write for Twecolog 28 giving data and prices on the complete TWECO line of electrode holders, ground clamps and cable connections for electric welding.

See Your Welding Supply Distributor

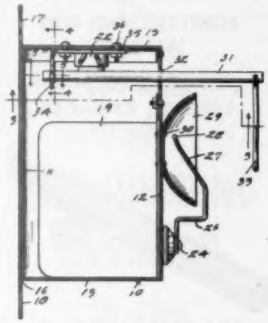
Tweco PRODUCTS COMPANY

TWECO PRODUCTS

BOSTON at MOSLEY
WICHITA, KANSAS

Oxyacetylene Torch Igniter

2,561,480. JOHN S. PFLUM, Connersville, Ind. Filed Dec. 19, 1949. Granted July 24, 1951 .



Newly patented torch lighter comprises a housing, a high tension coil inside the housing, a pair of spark-gap forming electrodes connected to the coil on the forward side of the housing and a bell-shaped reflector fixed to the same side. The spark-gap forming electrodes project into the open side of the reflector. A normally open switch in the housing is connected to the coil. A switch operating rod is rockably carried by the housing and projects from the forward side of it. A torch supporting member is carried by the forward end of the rod for supporting the torch nozzle in a position confronting the spark-gap forming electrodes. Downward rocking of the forward end of the rod moves the switch to circuit closing position.

* * *

Ceramic Welding Backup

2,558,411. CHESTER R. AUSTIN and ADRIAN G. ALLISON, Columbus, O. Assigned by mesne assignments to Battelle Development Corp., Columbus, O. Filed May 22, 1945. Granted June 26, 1951.

Patent covers the following chemical composition for a coating on a welding backup material: 90 to 99% wollastonite of particle size not greater than minus 100 mesh and from 1 to 10% inorganic bonding agent selected from the group consisting of clay and sodium silicate. The coating varies in thickness from 0.1 gram per square in. to 0.6 gram per square in.

* * *

NEW CLEANING compounds made by Pennsylvania Salt Mfg. Company form oversize micelles or groups of molecules which dissolve not only water-soluble soils but also water-insoluble soils. The latter normally can be removed only by organic solvents.

IT'S DOLLARS and SENSE
TO SALVAGE YOUR
WORN EQUIPMENT...

Rebuild
GYRATORY CRUSHERS
with MANGANAL

U. S. Patents 1,876,738 - 1,947,167 - 2,021,945

11% to 13% Manganese-Nickel Steel
ROUND APPLICATOR BARS

- YOU SAVE DOLLARS by replacing worn metal with MANGANAL. It's faster and more economical.
- YOU MAKE SENSE by rebuilding your GYRATORY CRUSHERS with MANGANAL because they usually outlast new ones.
- MANGANAL workhardens under impact and abrasion to 550 Brinell . . . tensile strength up to 150,000 P.S.I.
- MANGANAL Round Applicator Bars are available in 11 sizes for all degrees of wear.
- For greater strength and longer wear attach with MANGANAL Bare or Special TITE-KOTE Electrodes.

FREE
Literature on the latest methods for Speedy and Economical Repair of Worn Equipment.
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Name of Nearest Distributor Upon Request.

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92 N. J. Railroad Ave
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SAVE TIME and MONEY
NEW EASE AND SPEED
ON PIPE AND
STRUCTURAL STEEL
LAYOUT JOBS

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CONTOUR MARKER

Efficient, accurate, easy to use. Any of the angles illustrated can be marked off in 5 minutes or less with assured accuracy. Both models complete with adapter for square or rectangular shapes.

STANDARD MODEL
Fits into hip pocket. For use on pipe 1½ to 18 inches.

JUMBO MODEL
For 16 to 48 inch pipe. Includes belt to fasten on pipe.

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Please send me full details on the Contour Marker.
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CITY

Sellstrom Offers Glamour Shell-Rim Industrial Glasses with Steel Spring Embedded in Temples

The extraordinary feature of the new Sellstrom glamour glasses is a ¼" wide steel spring embedded in the entire length of the plastic temples. This makes them unusually pliable, but also keeps them firmly in place. The temples are ribbed at the ends and have optical hinges. The lenses are larger than the average and give greater protection to the eyes. Each pair comes in an attractive case.

The men's size has 49 m/m Drop Oval Lenses, while the women's size has 44 m/m Drop Oval Lenses.

Order a few sample pairs direct for "on the job" testing and we will then also give you the name of a nearby dealer who can supply you. Prices quoted are for less than dozen lots.

603 LCN—Men's, Clear XL Hard 1.25 D curve....$3.05
603 LCG—Men's, Clear XL Hard 6.00 D curve..... 3.30
604 LCN—Women's, Clear XL Hard 1.25 D curve.. 3.05
604 LCG—Women's, Clear XL Hard 6.00 D curve.. 3.30
604 LGN—Women's, Sel-Green Hard 1.25 D curve 3.55

SELLSTROM MANUFACTURING COMPANY

Sellstrom Safeguards Your Eyes and Face

626 N. Aberdeen St., Chicago 22, Ill.

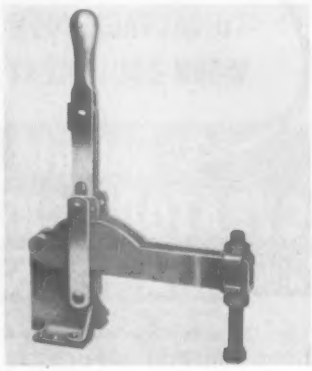
NO-SPAT eliminates slow, costly cleaning. Keeps adjoining surface spatter-free. Prevents rust, keeps welding jigs clean. No carbon monoxide. Send for FREE sample.

The Midland Paint & Varnish Co.

3803 E. 91st St. • Cleveland, Ohio

NEW PRODUCTS

(Continued from page 63)



Big Welding Clamps Can Exert 2,000-4,000 Lb

FOUR new quick-action clamps have been added to the "Knu-Vise" line for uses such as clamping parts of varying thickness or sprung parts. They are said to be the only big cam clamps that provide a convenient means for locating and adjusting the spindle assembly along the toggle bar. The spindle assembly can also be replaced by a special pressure pad.

Model CAV-1200 has recommended force of 1,200 lb at end of toggle bar and 2,550 lb with spindle located 3⅛ in. from front of base. Model CAV-2000 has a recommended force of 2,000 lb at end of toggle bar and 4,150 lb with spindle 3¼ in. from front of base.

Models CAS-1200 and CAS-2000 are like the above but have the additional advantage of permitting the toggle bar to swivel around the base to any position within 180-deg.

LAPEER MFG. CO., Lapeer, Mich.

* * *

Silver Coated Welding Lens Reflects Light, Heat

FOR use between the plastic cover lens and the dark filter lens, the new "Steinwach's Silver-Glo Lens" is claimed to afford added eye comfort and better vision. Other advantages claimed are sharper outline of welding area because virtually all reflection that might distort the image is removal, reflection of heat from work, elimination of expensive coated filter lens. The new lens should not be used without a filtering lens or cover lens.

The lens is available for both welding helmets and goggles.

STEINWACH'S SAFETY SUPPLY, 369 Ellicott St., Buffalo 3, N.Y.

W-AL-CO RODS

for Welding of ALUMINUM

ELECTRIC AND GAS WELDING

Drawn Wire
TYPES 2S, 43 and 52
Brazing 716

FOR CAST ALUMINUM

Use Extruded Rods
Types 142, 195, 355 and 356
for Better Welding
3/16" size only

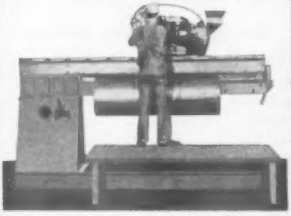
Aluminum Solder
White Metal

Welding Alloys Manufacturing Co.

744 Broad St. Newark 2, N. J.

REED ENGINEERING COMPANY

1007 W. Fairview Carthage, Mo.



HORN TYPE WELDING JIGS

★ IN 6 MODELS, CAPACITIES UP TO 9 FT. x ⅝ IN.
★ IN 2 STYLES FOR LIGHT OR HEAVY SHELLS
★ WATER-COOLED COPPER WELD BACKING BARS
★ POSITIVE, RIGID, TOGGLE-ACTION CLAMPING
★ TRACK FOR ANY AUTOMATIC WELDING HEAD

WRITE FOR BULLETIN 66

★ MODERN METALWORKING MACHINES
★ BENDING ROLLS ★ WELDING FIXTURES
★ FORMING MACHINES ★ TURNING ROLLS
★ SPECIAL MACHINES & FIXTURES

The October Issue of THE WELDING ENGINEER is the Annual METAL SHOW Issue

• • •

It will feature Welding in Defense

• •

Story on the Metal Show

• •

Details of the annual meeting of the AWS

• •

and all the usual features and departments found each month in America's pioneer welding publication,

THE WELDING ENGINEER

English Automatic Welder Uses Preformed Flux

THE new Elin-Murex automatic welder for heavy plate fabrication utilizes a coil of bare electrode wire. As the wire goes through the welding head, however, it is encircled by two halves of a preformed strip of flux, resulting in an electrode similar to the extruded types. Both wire and flux can be varied as required.

Complete outfit includes a mobile welding head on a specially designed gantry, a 60-volt d-c control set and two Murex dual control 400 amp welders hooked up in parallel. It may be used for submerged-arc welding as well as the above-described method. Rate of travel of the welding head varies between 4 ipm and 32 ipm.

MUREX WELDING PROCESSES LTD., Waltham Cross, Herts, England.

• • •

Pliers for Safety Goggles Speed Side-Shield Replacement

Two new safety goggle pliers are claimed to simplify and speed up the replacement of side shields on spectacle-type safety goggles. Called the No. 169 rivet knockout plier and the No. 170 riveting plier, they are so designed that inserting or removing of goggle rivets can be done in a few seconds without the removal of lenses.

The knockout plier has one jaw that is pointed to push out the rivet while the other jaw squeezes the rivet on all sides to hold it rigid. The rivet is pulled straight out so that it cannot bend.

The riveting plier guides the rivet while the other blunt end flattens it securely to the goggle frame. Both pliers are built of plated steel and weigh less than six oz. each.

THE AMERICAN OPTICAL CO., Southbridge, Mass.

NEW PRODUCT BRIEFS

Storing welding cable more efficiently and safely is easy with the wall-mounted "Powereel" which accommodates sizes up to No. 4 four-conductor electrical cable. Comes with collector ring assembly. INDUSTRIAL ELECTRICAL WORKS, Dept. 51, 1511 Chicago St., Omaha 2, Nebr.

• • •

Phosphatizing action of Anchorite 100, a new paint base, changes the surface of steel, iron, zinc and cadmium parts into an inert phosphate compound highly resistant to corrosion. It is applied by spraying or dipping. OCTAGON PROCESS, INC., 15 Bank St., Staten Island 1, N.Y.

Tempilstik°

the amazing Crayons that tell temperatures

A simple method of controlling working temperatures in:

- WELDING
- FLAME-CUTTING
- TEMPERING
- FORGING
- CASTING
- MOLDING
- DRAWING
- STRAIGHTENING
- HEAT-TREATING IN GENERAL

It's this simple. Select the Tempilstik° for the working temperature you want. Mark your workpiece with it. When the Tempilstik° mark melts, the specified temperature has been reached.

$2 gives up to 2000 readings

Available in these temperatures (°F)

113	263	400	950	1500
125	275	450	1000	1550
138	288	500	1050	1600
150	300	550	1100	1650
163	313	600	1150	1700
175	325	650	1200	1750
188	338	700	1250	1800
200	350	750	1300	1850
213	363	800	1350	1900
225	375	850	1400	1950
238	388	900	1450	2000

Also available in pellet or liquid form.

FREE —Tempil° "Basic Guide to Ferrous Metallurgy" — 16¼" by 21" plastic-laminated wall chart in color. Send for sample pellets, stating temperature of interest to you.

BOOTH C-117
NATIONAL METAL SHOW
DETROIT, OCT. 15-19

Tempil° corp.
134 WEST 22nd STREET
New York 11, N. Y.

Now on press

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13th Edition

of

THE WELDING ENCYCLOPEDIA

by T. B. Jefferson

• • •

Completely revised and up-to-date, the thirteenth edition will be bigger and better than ever

•

Watch THE WELDING ENGINEER for announcement of publication date

INERTING OIL TANKERS

(Continued from page 60)

plying the heat, the user will find that his lines get plugged with dry ice. Or dry ice may accumulate in the cargo tanks of the vessel, and he will either have to wait for it to sublime or else overrun the requirements for gas. The first is costly in time; the second in gas. To prevent the formation of dry ice, a heat exchanger must be installed in the line.

The most common type of heat exchanger (vaporizer) is the steam-heated one. About 120 Btus are required to vaporize 1 lb of liquid CO_2 at 0 F. One pound of steam at 10 psi will vaporize 8 lb of CO_2. If steam is not available, vaporizers are built to be heated by gas or electricity.

What are the advantages of CO_2 inerting as opposed to the conventional methods of gas-freeing?

They are three: increased safety, savings in money and savings in time.

The amount of money that can be saved is controversial. There are different ways of cleaning, and nearly every yard has local conditions that affect the cost of the operation one way or the other. The price of CO_2 varies somewhat according to location, and, furthermore, every owner has a different price on the "laid-up" time of his vessels. Nevertheless, a study of the accumulated experience of two years shows that an inerting job can be done for an average cost to the owner of about 6 cents per barrel-capacity of the volume to be inerted. A 12,000-barrel barge could therefore be inerted for $720. This cost includes chemist's fee but does not include the detention time of the vessel. Compared to the detention time charged to gas-freeing, however, that of inerting is negligible.

An average figure for gas-freeing costs is very hard to get. One large oil company, which does most of its cleaning itself, gave the following average figures for the vessels:

12,000-bbl barge	$1,075
18,000-bbl barge	1,475
17,000-bbl tanker	1,990

These figures *do* include detention time, which averaged 28 hours and is the explanation for the greater expense for the tanker. The company that gave the writer these figures told him they were for gas-freeing done at its own refinery and would be double

TILLMAN

GLOVES • GARMENTS

BRAZILIAN DEERSKIN
Gloves and Mittens
The stay soft leather

ask your
DEALER
for

TILLMAN PRODUCTS
JOHN TILLMAN & CO.
LONG BEACH, CALIF.

HITCH on to these

Model 1-B Now only $4.95 Post Paid (when paid in advance)

Sell-on-sight Bull Dog Hitches . . . the ball and socket coupler that can't let go. Heavy drop forge steel construction for trailers up to 2500 pounds. Shank diameter—1⅜". Fits 1¼" pipe tongue.

AXLE ASSEMBLIES

Model 1UCO $61.56 Less Tires F.O.B. Factory

for quicker sales! Farm-proved strength. Best built for farm implements, wagons—trailers of every kind. Includes everything except tires. Either 15" or 16" wheels.

JACK—satisfied customers bring in others. Bull Dog Jacks make easy, one-man job of parking or hitching trailers—farm implements. All steel. Heavy duty, ball-bearing swivel action. "Can't lose" crank. Complete with brackets, ready to install.

Model 60-F Only $15.75 Post Paid (when paid in advance)

Write today for descriptive folders and price sheets. Substantial, worth-while discounts to established shops.

Hammer Blow Tool Company
Wausau 19 1, Wisconsin

if the work was given to an outside yard.

A compendium of case histories presents the following comparative tabulations for a 17,000-bbl coastwise tanker.

To Gas Free

Two days demurrage @ $1,080	$2,160
Steaming and washing	2,000
Chemist	25
	$4,185

To Inert

Two hours demurrage	$ 90
Five tons of CO_2 @ $200	1,000
Chemist	100
	$1,190

Savings by inerting $2,995.

Cost of Equipment

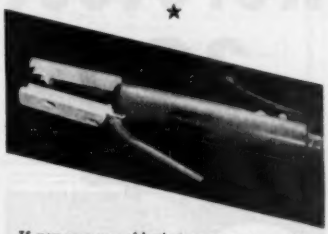
The cost of equipment will vary, of course, with the size required. Some concrete figures will give an idea of the capital investment involved. A 9,000-barrel barge like Sohio No. W918 will require roughly 5,000 lb (2½ tons) of CO_2 to inert it. Though storage tanks can be built in any size, there are certain sizes for which patterns and calculations have been completed. These are known as stock sizes and are furnished at a lower cost than special models. The smallest stock model that it would be practical to install where repair work is to be done on barges or coastal tankers of the size of Sohio W918 would be a six-ton tank. With auxiliary equipment, vaporizer, controls, hose, etc., this unit would cost approximately $9,550. If a yard's business comprehended large ocean-going tankers, the smallest unit practicable would be a 32-ton tank costing about $21,500. In each of these cases, the tank size has been selected to give the user a reserve supply; so that, after doing an average job of inerting, he would have enough gas remaining to do another while he waited for a refill.

The cost of doing the actual inerting is, of course, determined by the cost of the liquid CO_2. This is governed by too many local conditions to make it possible to name a fixed figure. The same local conditions, however, affect the cost of gas-freeing and, as between the two methods in the same yard, inerting will be found to be the cheaper.

There can be comparatively little argument over the matter of time sav-

Big Advancement in Metal Removal

***Arcair* TORCH**



If you now use chipping or oxygen gouging you can increase production and make more profits with the ARCAIR Torch.

the ARCAIR Torch . . . is a gouging and cutting torch which operates on an ordinary DC welding machine and a compressed air line—

the ARCAIR Torch . . . removes defects in castings or forgings, cleans roots of welds, removes welds—and gouges, cuts or bevels mild steel, stainless steel, hard alloys, brass, bronze, monel, cast iron, or any other metal—the ARCAIR Torch . . . works on ALL metals—no oxygen or fuel gas required—

• Write today for folder which gives all details

***Arcair* Company**

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SOLDERING
and
WELDING
PRODUCTS
—the choice of successful welders

SEAL-X-O

A preparation used for sealing air holes on electric welds on water jackets, etc. Can be used as a filler over rough welds. Where no tensile strength is needed it has many uses. This and all METAL BOND products can help you make more money on every welding job.

• Send for our pocket-size catalog. Contains information on welding, brazing, and soldering with descriptions of money-saving METAL BOND Products.

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ALWAYS SAY
Kerotest
306
FOR OXYGEN SERVICE

KEROTEST MANUFACTURING COMPANY
Pittsburgh 22, Pa.

"Red Head"
WELDING CLAMPS

Designed for Welding

Made to take abuse

1. Case Hardened threads are always protected from weld spatter and never exposed to damage in open or closed position.

2. The clamp body is cut from solid plate and heat treated to give greater resistance to bending and twisting.

3. Heat treated chrome molybdenum alloy handle offers great resistance to bending.

23 stock sizes

CHICAGO BOILER COMPANY
1969 CLYBOURN AVENUE
CHICAGO 14, ILLINOIS

ings. A vessel can be completely inerted with CO_2 in an hour or less, depending upon conditions on board and the capacity of the equipment used.

Considering all the factors, inerting represents a considerable step forward in shipyard methods.

SEAGOING PIPE LINE

(Continued from page 39)

of these welds, however, took from early morning until late in the afternoon because of the difficulty of securing proper alignment on the high seas.

To add to the difficulties, the welds that united a floating section to the portion of the line already completed could not be tested after welding. Utmost care and the skill of a proved weldor were relied on to insure the desired quality. Naturally, these welds were rated as the most important in the whole undertaking.

The sea-welded pipe was doped and the joint carefully wrapped to guard it against corrosion. Then the new and old portions of the line were allowed to submerge.

Laying of the newly attached portion of the line on the bottom was accomplished by lowering the junction weld, which dragged the nearest supporting drums down with it. The remaining drums were set free by working progressively along the floating section and actuating the cutters that severed the straps. This allowed the bare line to settle. Before the outer end went under, it was sealed with a bull-plug, and its location was marked with a buoy. Drums and cutters, salvaged as the flotilla moved out to lay and release the pipe, were taken to the shore base and given whatever reconditioning was necessary before reuse.

The various "drags" were welded into a pipe line that ran from water level at the shore to 44 feet below the surface at the oil company's platform 12 miles out to sea. The line was tested under pressure and found to be leakproof. Cathodic protection was provided through magnesium anodes at both ends. The shoreward end was buried in a trench jetted into the Gulf bottom, and markers were erected to warn ships against anchoring over the submerged pipe.

Gas flowing through the line goes into a transcontinental trunk line and is eventually delivered to consuming points in Eastern cities.

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GOVERNORS

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Dept. WE, Orrville, Ohio

If this or other advertising does not supply the information concerning products or services wanted, please write:
WELDING ENGINEER

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(Classified Advertising)

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P1753 WELDING ENGINEER
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CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

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Fairbanks Morse Co., Mfg.

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RECIRCULATING PUMP—¼ HP.
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750# Harmomang—5/32,
500# Harcote—⅛,
500# Harcast—⅛,

PAVLIK BROS.
KENILWORTH, ILL.

STAINLESS STEEL ELECTRODES

17,500	3/32"	Page	18-8
700	3/32"	Arcos	19-9
4,050	1/8"	Airco	18-8
8,500	1/8"	Page	18-8
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RALL SUPPLY CO. 110 E. 42nd St., NYC 17

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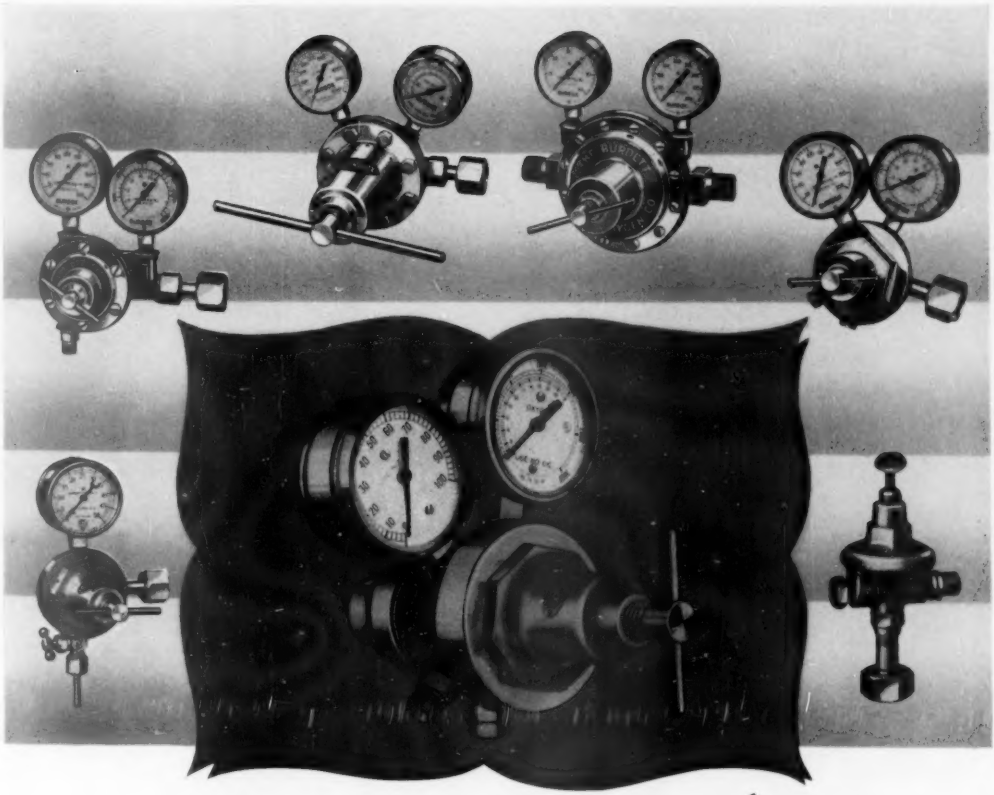

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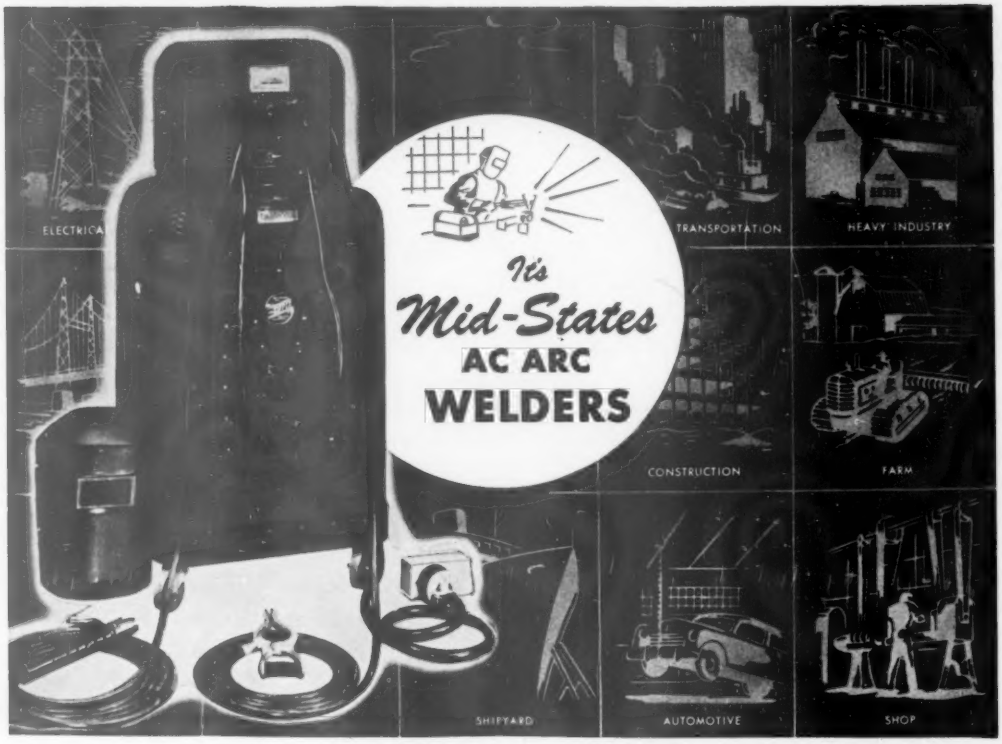

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